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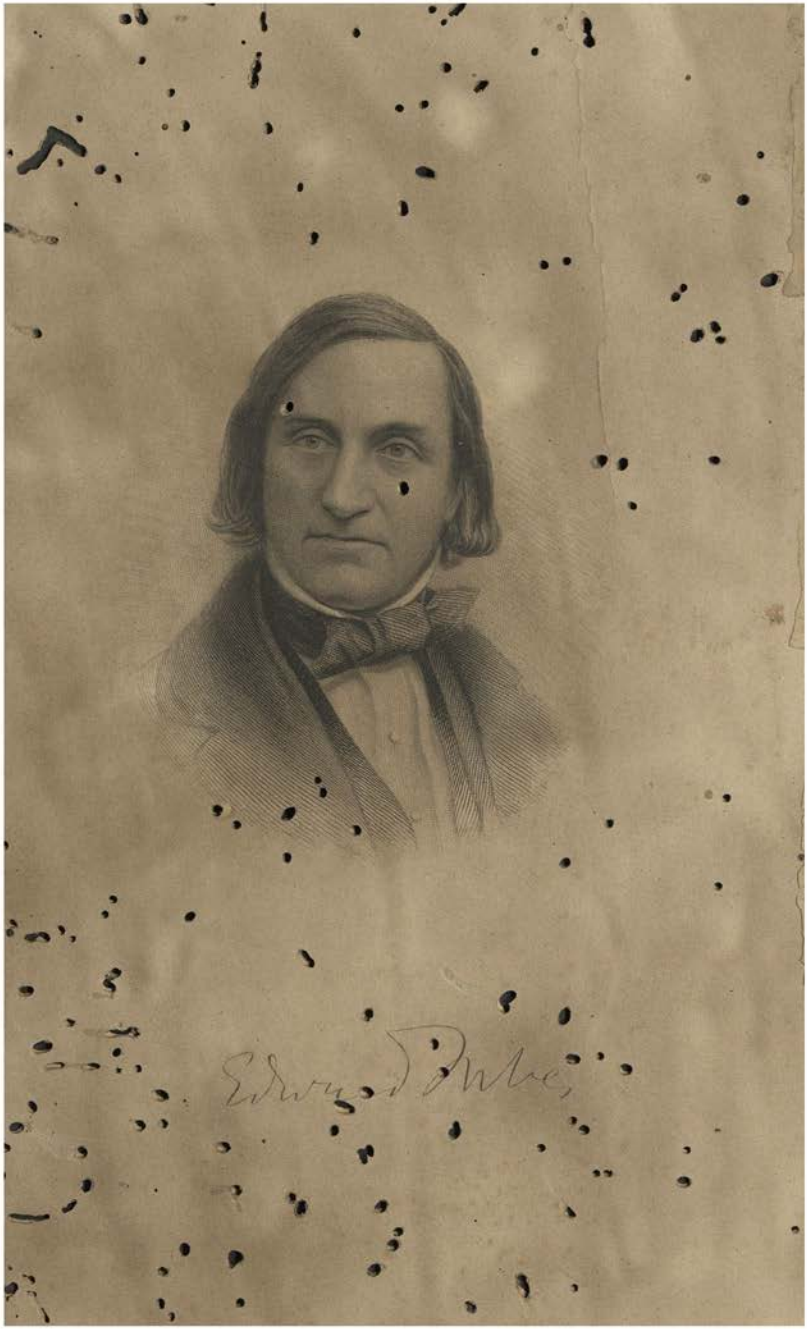

MEMOIR OF

EDWARD FORBES, F.R.S.

LATE REGIUS PROFESSOR OF NATURAL HISTORY IN THE UNIVERSITY OF EDINBURGH.

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AND

ARCHIBALD GEIKIE, F.R.S.E., F.G.S.

OF THE GEOLOGICAL SURVEY OF GREAT BRITAIN.

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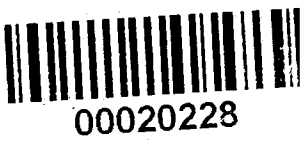
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"THE loss sustained by the death of [this great Naturalist] was aggravated to those who knew him, by the consideration of how much of his knowledge had perish[illegible] himself, and, notwithstanding all that he had written, how much of the light collected by a life of experience and observation was now completely extinguished. It is, indeed, melancholy to reflect, that with all who make proficiency in the sciences, founded on nice and delicate observation, something of this sort must invariably happen. The experienced eye, the power of perceiving the minute differences and fine analogies which discriminate or unite the objects of science, and the readiness of comparing new phenomena with others already treasured up in the mind, these are accomplishments which no rules can teach, and no precepts can put us in possession of. This is a portion of knowledge which every man must acquire for himself, and which nobody can leave as an inheritance to his successor. It seems, indeed, as if Nature had in this instance admitted an exception to the rule, by which she has ordained the perpetual accumulation of knowledge among civilized men, and had destined a considerable portion of science continually to grow up and perish with the individual."—*Playfair's Biographical account of Dr. Hutton*, Works, vol. IV. p. 33.

PREFACE.

THIS Memoir was begun by the late Dr. Wilson towards the close of 1854, very soon after Professor Forbes's death. He made a considerable collection of materials, in the form of letters, note-books, and other papers. The weakness of his health, however, together with the constant demands upon his time and labour, greatly hindered his progress, so that he had only advanced to the close of the sixth chapter when, in November 1859, he was seized with the illness which rapidly carried him to the grave. These six chapters were never revised by him; nor has it been thought expedient to make any change upon them—they are printed as they came from his pen. He left no notes or outline of the work beyond the point where his manuscript ended, and thus the greater part of the Memoir remained still to be written.

Having for many years enjoyed the privilege—never to be forgotten—of Dr. Wilson's intimate friendship, the task of continuing and completing his biography of the great naturalist was, in the spring of 1860, in-

trusted to me. The duties of a member of the Geological Survey are little favourable to continuous literary work. Hence the Memoir has proceeded slowly, at broken and uncertain intervals, amid many changes of abode, and at a distance from libraries and books of reference. A year has thus passed away, and only now, after the lapse of so long a period since the death of Professor Forbes, is this imperfect record of his life completed.

To the numerous friends who, in addition to the papers and information supplied by the family, have furnished the materials of the following pages, every acknowledgment is due: especially to Mr. Robert Patterson of Belfast, who lent an ample collection of letters to the late Mr. William Thompson, Captain Graves, and himself; to Professor Ramsay, who supplied many incidents relating to Forbes's connexion with the Geological Survey; and to Mr. J. Beete Jukes, whose assistance throughout has been of the most essential service. Sir Roderick Murchison, Principal Campbell of Aberdeen, Professors Bennett and Balfour of Edinburgh, Mr. Leonard Horner, Dr. Percy, Dr. Day, Mr. Trenham Reeks, Mr. Bowerbank, Mr. Bristow, Mr. Baily, and others, have kindly supplied letters and information.

The tail-pieces scattered through the volume have been selected from a large collection of the rough pen-and-ink sketches with which, in his leisure moments, Forbes's pen was ever busy, some of the best having been

furnished by Mr. Bowerbank. They are introduced, for the most part, without reference to the text—a mode of illustration to which Forbes himself was partial, and which was adopted by him in his *History of British Starfishes*.

Among his papers was found a small octavo note-book, in which he recorded his writings, literary and scientific, from 1831 up to the month before his death. This list—itself incomplete—has been used as the basis of that given in the Appendix to this volume. Of the numerous articles and critiques which he wrote for periodicals, a large number could with difficulty be recovered. With a few exceptions, only those are given in the Appendix which he regarded as worthy of being chronicled in his own list.

ARCH$^{D.}$ GEIKIE.

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MEMOIR OF EDWARD FORBES.

CHAPTER I.

THE ISLE OF MAN.

In the centre of the Irish Sea, midway between the shores of England, Scotland, Ireland, and Wales, lies that diminutive continent which, as if it were an epitome of the whole world, bears the title of the Isle of Man. On the chart it looks like one of the pieces of a child's puzzle-map which has strayed to a distance from the adjacent shores. It can be fitted, however, into none of them, and geologists tell us that it is in its true place, and represents one of the few surviving portions of a tract of land which once united the British Islands, but has long since left only fragments above the waves.[1]

[1] "We know," says Edward Forbes, "that the Irish Sea is scooped out of the elevated bed of the sea of the glacial epoch, masses of which, of great extent and thickness, we find bounding its sides in England, the Isle of Man, and, still more conspicuously, in Ireland, and that on the great Pleistocene plain, lived the *Cervus Megaceros*."—(*The Geological Relations of the existing Fauna and Flora of the British Isles*, by Edward Forbes, *Mem. of Geol. Surv.* vol. i. 1846, p. 344.) There was thus a "land of passage" occupying the Irish Sea and making England and Ireland one. Over this bridgeway the great elk, now extinct (as well as other creatures), passed and repassed, and its bones are now found alike in Ireland and the Isle of Man.

They have spared, indeed, little of the fertile plains which once filled the Irish sea, for the Isle of Man is scarcely more than thirty miles long, and twelve miles broad, and the number of its inhabitants, at any one time, has probably never exceeded fifty thousand.[1] Yet for centuries it was a kingdom with a king to itself, a council, a jury-parliament, a *Lex Scripta*, administered by oligarchs who were at once lawgivers, judges, and magistrates, a peculiar ecclesiastical polity, and a people acknowledging singular customs, and so loving their own ways, that they resisted to the last even partial amalgamation with Great Britain, and always called their birth-place THE ISLAND, as if it had the pre-eminence among the islands of the sea.

In this tiny kingdom Edward Forbes was born early in the present century, and he spent, consecutively, the first sixteen years, or altogether more than a third of his mortal life, within its shores.

The peculiarities of his sea-cradle exerted a marked influence over the development of his character. They largely determined the special channel in which his genius ultimately sought its fullest flow. Eminently catholic, moreover, though he was in all his manifestations and sympathies, he displayed, withal, an insular quaintness of manner and independence of character to the end of his days. He suffered also from the comparatively limited means of education which, in his youth, the Isle of Man offered to its inhabitants.

[1] *Historical and Statistical Account of the Isle of Man*, etc., by Joseph Train, 1845, vol. ii. p. 383; and *The Isle of Man; its History—Physical, Ecclesiastical, Civil, and Legendary*, by the Rev. George Cumming, 1848, p. 283. Both works will be repeatedly referred to in the sequel as Train's *Isle of Man*, and Cumming's *Isle of Man*.

A preliminary glance, accordingly, at the history and characteristics of that curious island, will enable us, before entering into the details of his personal career, to form an unbiassed judgment as to the influence for good or evil which its peculiarities exerted upon Edward

s impossible to approach the study of the Isle of vithout encountering two somewhat formidable s to a better acquaintance with it; the one, a discussion among the etymologists as to the origin aning of its name; the other, a not less troubled dispute among the heralds as to the significance of its coat of arms. Both name and arms are singular, and easily tempt to fanciful interpretations; nor was the subject of my memoir behind his countrymen in speculating on both.

The interpretation of the name of MAN, of which Edward Forbes, I think, would most have approved, is that of the old writer Gildas, who tells us that "The Isle of Man is seated in the navel of the sea, as it were in the very midst of all that the kings of Great Britain do command, even as the heart of man is seated in the midst of his body. The comparison will hold very fitly; for the heart of man is compassed in a bag of water, called the *pericardium*, and therefore the heart of man may truly be called the Isle of Man."[1] On this interpretation no philologist could be expected to look with any favour.

Mr. Train tells us that the inhabitants "call their island '*Mannin*,' '*In*' being an old word for 'island;' there-

[1] Quoted by Train. *Historical Account*, vol. i. p. 39.

fore, Meadhon-in (pronounced 'Mannin'), signifies literally, 'The middle island.' May this not be the true derivation of the name ?"[1]

The statute-book of the island gives another meaning or origin to the word. "Mannanan-Beg-Mac-y-Leirr, the first person who held Man, was the ruler thereof and after whom the land was named, reigned many and was a paynim. He kept the land under mist necromancy."[2]

According to another authority, Manninan ancient Irish name for Neptune, and Man may have been applied to the island "as the supposed residence of this god."[3]

Bishop Wilson thought the "Isle of Man very probably had the name it goes by now from the Saxon word 'mang,' *among,* as lying almost at an equal distance between the kingdoms of England, Scotland, Ireland, and Wales;" but no etymologist, I imagine, will for a moment sanction this derivation. Mr. Cumming refers Man to the ancient British or Cymric word "Môn," signifying *isolated*; or, to another term in the same language, "Maen," "*a pile of stones or rocks.*"[4]

Which one, if any, of those derivations is the true one, I shall not attempt to decide. It is worth while, however, to notice, that the word *Man* yields the peculiar adjective *Manx, e.g.*, Manxman, a native of Man: and that the Latin term *Mona*, by which the Roman historians distinguished Man, as well as Anglesey, yields *Monensis*, applied, by the subject of this memoir, to his

[1] *Op. et loc. cit.*

[2] *Ibid. Ibid.*

[3] Quiggin's *Guide through the Isle of Man.* 5th Ed. 1856, p. 1.

[4] *History.* Appendix A. p. 256.

Catalogue of the Mollusca of the Irish Sea—*Malacologia Monensis.*

The singular armorial bearings of the island, or rather the interpretations put upon them, are still more interesting for us than those connected with its name, as illustrating the determination of the Manxman to be a Manxman, and not a Briton. Even so late as 1857, the Rev. J. G. Cumming (who, however, is Manx only by adoption) writes of his adopted country, "that though in the midst of the British isles, it is in point of law no part of them;[1] that though a possession of the British Crown, it is not ruled by the British Parliament; that though its people have the rights of British subjects, it is no part of England, is not governed by the laws of England, and belongs not to England by colonization or by conquest."[2]

The ancient kings of Man of the Norwegian race, had for their arms a ship, with the motto, "Rex Manniæ et Insularum," an excellent device for the shield of a sea-king; but after the Scottish conquest (A. D. 1270), the present well-known heraldic symbols were introduced. They consist of "three armed legs, proper, conjoined in fess at the upper part of the thigh, flexed in triangle, garnished and spurred topaz, with the motto, '*Quocunque jeceris stabit*' (whichever way you shall have thrown it, it will stand), surrounding it in a garter."[3]

[1] Nevertheless, Mr. Walter Cooper Dendy has not been afraid to include it in the objects discussed in his pleasant and gracefully illustrated volume—*The Beautiful Islets of Great Britain.* 1857.

[2] 'The Story of Rushen Castle. Introductory Notice, p. vi.

[3] Train's *Isle of Man*, vol. i. p. 79. Cumming's *Isle of Man*, p. 261.

The three legs are in themselves innocent enough, and perhaps meant no more originally than they did in the ancient shield of Sicily, where they were understood to symbolize the triangular shape of the island. Man is, in a mathematical sense, less perfectly triangular than Sicily, but facing three kingdoms in as many directions, it is geographically and politically a more perfect triangle. It is possible, also, as Mr. Dendy suggests, that the armorial device had originally some connexion with the legend of a three-legged wizard, who, by his spells, covered the island with mists; but if so, that connexion is now forgotten;[1] however we interpret it, it plainly refers to an essential not an accidental attribute of the island.

Ingenious Manx commentators draw our attention to the fact, that however you turn the shield the attitude of the legs remains the same, and that no transposition of the words of the Latin motto alters its meaning. They differ considerably in the interpretation which they put on the words and the symbol, but all agree in finding in them an expression, on the part of Manxland, of self-reliance, independence, and neutrality. According to one reading, the three spurred feet and armed heels, defy simultaneously England, Scotland, and Ireland. According to another, one limb is bent, as if kneeling in allegiance to one of these countries, and the other two are upraised in defiance of the remainder. An English writer discovers that the kneeling limb is bent towards England, and the recalcitrating toe and heel turned towards Scotland and Ireland,[2] forgetting

[1] *Beautiful Islets of Great Britain*, p. 84. [2] *Ibid.* p. 79.

that it was under a Scottish king, Alexander III., the symbol was introduced, and that one of its peculiar virtues is, to have the same significance in whatever direction it is turned.

The intelligent editor of Quiggin's *Guide-Book to the Isle of Man*, interprets more modestly and somewhat differently. "The three legs refer to the relative situation of the island with respect to the neighbouring nations of England, Scotland, and Ireland, previous to their union, since which the symbol entirely loses its propriety, and has become obsolete and unmeaning. . . . The legs are armed, and while in whatever position they are placed, two of them fall into the attitude of supplication, the third, being upwards and behind, appears to be kicking at the assailant against whom the other two are imploring protection. The *vis* of the symbol is, that if England should seek to oppress the island, it would soon engage Ireland or Scotland to afford protection; and if either of these two should assail it, that it would hasten to call England to its defence."[1] Many are content to read the motto almost literally, and to understand it as imputing to the Isle of Man, historically personified, a cat-like aptitude when knocked about, for alighting on its feet.[2] This, certainly, is the verdict of history on the fortunes of Man, which have thriven in spite, and often because of the troubles of its neighbours; and though the herald of the thirteenth century who devised the three-legged ensign did not formally prophesy as much, we are probably not mistaken in thinking that he hid some such

[1] Quiggin's *Guide-Book to the Isle of Man*, p. 32.

[2] Train's *Isle of Man*, vol. ii. p. 81. Cumming's *Isle of Man*, vol. ii. p. 261.

meaning under his significant symbol. At all events, it is full of meaning to Manxmen of the present day. To none was it more expressive than to Edward Forbes. He had a peculiar fancy, as we shall afterwards find, for all triangular arrangements. The three-legged Manx symbol is continually repeated in his note-books, and all familiar with his History of British Star-Fishes will remember how prominently it figures in the exquisite vignette on the title-page of that work.

The people who thus strongly assert their insular individuality, if regarded as distinctively and historically Manx, are a Celtic race, speaking a dialect of the Erse, and more akin to the Irish than to the Scottish or Welsh Celts. The mother of Edward Forbes was of an old Manx family, and from her he inherited lands in the island, so that his patriotism as a Manxman was rooted in the soil. A glance at the fortunes of his insular forefathers will prepare us for some of the influences which moulded his character.

The history of Manxland begins in the usual mythical way, and recedes into a region of clouds, where we need not follow it. From this dim pre-historic dawn, through which the shadowy figures of lost races of men and mystical Druids questionably hover, the Isle of Man emerges in the end of the third century, at which period, occupied as it was by a people who had no written annals or literature of any kind, it was conquered by an ancient Scot, called Brule, "who divided the land between himself and his followers, and the 'original contract' became the foundation of their laws."[1] To Brule succeeded a

[1] Train's *Isle of Man*, vol. ii. p. 186.

dynasty of Welsh princes, who reigned as kings for nearly four centuries, and added to the Manx statute-book not a few laws, which remained in force long after the lawgivers had been driven from the island. They were dethroned by Norwegian princes, who held Man for several generations, but were quietly dispossessed in the early part of the tenth century by Orree or Gorree, a Scandinavian—probably Danish—Sea Rover, in whose family the sovereignty remained for more than a hundred years. Orree (or Orry) is the most famous of the kings of Man. He holds the same place in a patriotic Manxman's heart that Alfred does in that of an Englishman, or Bruce in that of a Scotchman. He owes this veneration to the laws he gave his people. They refer to him the territorial divisions of the island which still exist, the establishment of the Taxioxi (a jury parliament, now called the House of Keys), and the reduction, for the first time, of the laws of Man to writing.

In the eleventh century, the descendants of Orry were supplanted by Goddard Crovan, an Icelandic prince, whose family ruled in Man, with the title of kings, for nearly two hundred years. These princes were feudatories of the Norwegian Crown, and when the ninth and last of them died in the middle of the thirteenth century, the Isle of Man was ceded by Norway to the King of Scotland.

The people, who were not consulted in this transfer, gained nothing by the transaction. For nearly a hundred and fifty years, the island was continually changing masters at very short intervals. The Scottish king,

Alexander III., held it for a time; then Edward I. of England took possession of it, but resigned it before long to John Baliol. It soon reverted to the Crown of England, but was speedily restored to Scotland by Robert the Bruce, and in the confusion inseparable from all these changes, it was plundered by a band of Irish freebooters under Richard de Mandeville, who swept over it in 1316, and after spending a month in stripping the island of everything valuable, made off with their plunder. Within some twenty years the island was again in possession of the English, and in 1344, Edward III. raised William Montacute, Earl of Salisbury, to the throne of Man. In 1393, this Earl sold the island to Sir William Scroop, the King's chamberlain, afterwards Earl of Wiltshire, "with the title of king, and the right of being crowned with a golden crown." The golden crown, however, brought no blessing to the Earl's brows. In 1399, he was beheaded for treason, and Henry IV. transferred the Isle of Man to Henry Percy, Earl of Northumberland. Percy also was soon attainted for treason, and though allowed to keep his head, was deprived of the island, which the king conferred upon Sir John Stanley. This brings us to the year 1406, when the modern history of the Isle of Man may be regarded as beginning.

The house of Stanley, on which, in a later generation, the earldom of Derby was conferred, ruled the island for more than three centuries, with the exception of a brief interregnum (1652–1660) during the Commonwealth, when Lord Fairfax held its sovereignty. For the first century of their rule, the Stanleys reigned as kings, but

in 1505, Thomas, grandson of the first earl, "succeeded to the title of Earl of Derby and King of Man; but preferring, as is stated by a subsequent earl in a letter to his son, 'to be a great lord rather than a petty king,' he relinquished the royal designation, and thereafter assumed only the title of Lord of Man."[1] In 1736, James, the tenth earl, and thirteenth in the Manx dynasty, died without surviving issue, and the Lordship of Man passed by the female line to James Murray, second Duke of Athol, in right of his grandmother, Lady Amelia Sophia Stanley, daughter of James, the great Earl of Derby, who was beheaded by the Parliamentary forces, in 1651, for his services to the Stuarts.

The Dukes of Athol held the lordship of Man through three generations extending nearly over a century; but even before their accession the island had become such a thorn in the side of Great Britain, as a nest of smugglers and questionable refugees, that she had resolved to take it into her own hands. A change of dynasty made this more easy, and the Dukes of Athol finding that nothing remained for them but to resign their lordship with as good a grace, and on as favourable terms as possible, reluctantly sold their birthright; and the Isle of Man, partially ceded to England in 1765, passed in 1829 under the direct rule of the British Crown.

The peculiar laws of the island, however, were scarcely interfered with. At present "the Civil Government of the Isle of Man is vested in three estates—the Queen in Council, the Governor and Council, and the House of Keys. These last two estates together constitute a Court

[1] Train's *Isle of Man*, vol. i. p. 167.

of Tynwald; and the concurrence of the three is essential to every legislative act."[1]

It is necessary here to enter a little more particularly into the later history of the island.

The Isle of Man steadily advanced in prosperity under the House of Stanley, and whilst civil war was desolating the neighbouring countries, knew almost uninterrupted peace; but in the end this peace proved fatal to its independence. After the Restoration of Charles II. down to the close of the seventeenth century, it was little interfered with by Great Britain. England, Scotland, and Ireland, were alike distracted with revolutions and rebellions, and left the Manxmen to their own guidance. For a season the Isle of Man was practically a republic. The eighth Earl of Derby (1660-1672) had simultaneously lost the favour of his subjects and his king by the execution of William Christian (1663),[2] and Tynwald Courts were held without the presence or sanction of the Lord Superior. In consequence of this state of matters the Isle of Man became again a centre of attraction to sea-rovers, but instead of Norse pirates it now welcomed French and Dutch smugglers. The native Manxmen were not originally to blame for the bad repute into which these modern buccaneers brought their island. As early as 1670, a company of adventurers from Liverpool settled at Douglas for the avowed purpose of carrying on a contraband trade with the surrounding shores;[3] but

[1] Quiggin's *Guide to the Isle of Man*, p. 77.

[2] One of the posthumous heroes of Sir Walter Scott's *Peveril of the Peak*. He is referred to more specially in the sequel.

[3] Train, from whom this statement is taken (*Isle of Man*, vol. ii. p. 306), refers to an older historian of the island, Bullock, and adds, "such advantages were held out by these illicit traffickers, as they were then called, to merchants

they soon tempted the Manx people to abet them, and before long the great body of the islanders abandoned their pastoral pursuits and fisheries to become carriers of illicit goods. That they should have done so is not very surprising. They could justify their smuggling transactions by better arguments than most communities can. They were not only as slow as the less conscientious mass of mankind have always been to acknowledge that smuggling is both a crime and a sin, and as much disposed, as that majority always is, to hold with the Spartans, that at the utmost it becomes a crime only if discovered; but they could plead that they broke no Manx law by smuggling, and that they enriched, instead of impoverishing, the insular treasury by their illicit traffic. For its existence, accordingly, the English and Scottish Lords of Man, including, however, their constitutional Manx advisers, must bear the chief blame.

The eighth Earl of Derby, under whose lordship of Man systematic smuggling began, died before it had acquired a sure footing in the island, and was probably but slightly responsible for its encouragement. His son and successor, the ninth Earl (1672-1702), sanctioned, in 1696, the passage of a Tynwald act permitting all and every person and persons of any kingdom or nation, whose prince is at peace with the Crown of England, to enjoy, as residents of the Isle of Man, the same privilege as subjects of England had enjoyed. It would be uncharitable to impute unworthy motives to the enactors of

engaged in the foreign trade, that many ships laden with the produce of the East and West Indies, touched at the island and met with a ready sale for their cargoes." In this way the English duties were evaded, and the goods lightly taxed by the Manx authorities, were then smuggled into Great Britain.

this law, which, in truth, was but the tardy abrogation of a restriction to free intercourse with the island, imposed at a time when great jealousy of Scotland prevailed. In itself both just and politic, this enactment secured an asylum for the Protestant refugees from Ireland, and a hiding-place for the Jacobite wanderers on whose heads a price was set in Scotland;[1] but it also tempted wealthy men from all the surrounding shores to carry their capital to the Isle of Man, and invest it in the profitable iniquity of smuggling. Many capitalists, accordingly, took up their residence in the island, and provided remunerative employment for its humbler inhabitants. How welcome moneyed men were, may best be inferred from the fact that in 1702, Lord Derby, the tenth Earl and last Lord of Man of the House of Stanley, farmed the revenue of the island to a merchant in Liverpool, for £1000 per annum;[2] and in 1710 advanced to his subjects the loan of a hundred pounds,[3] which, with his approval, they expended in a vain attempt to prevent their fiscal laws being altered by the English Parliament. The smallness of the loan, and the use to which it was put are equally significant, as showing the poverty of both lord and people, and their unanimity in regarding smuggling as its cure. They showed this by deeds even more than by words. The wilder spirits became sailors under skilful and daring commanders, chiefly foreigners, who despised alike the terrors of the law and the tempest, and, quite ready to measure their strength with the king's cruisers,

[1] David Forbes, the great-grandfather of the subject of this Memoir, was one of the many adherents of the Stuarts who, after 1745, profited by the enactment under notice to settle in Man, as described more fully in the succeeding chapter.

[2] Train's *Isle of Man*, vol. i. p. 244.

[3] *Ibid.* vol. ii. p. 308.

repeated the feats of the ancient Vikings on the shores of Man.[1] The less adventurous natives of humble rank carried contraband goods in their wherries to the adjacent shores, and attended the landings of the vessels; whilst the wealthier islanders (in most cases, Manxmen only by adoption) erected ample subterraneous cellars as secret storehouses for their unlawful merchandise. With the exception, accordingly, of an upright protesting minority, eloquently represented by good Bishop Wilson (1697-1755), the Isle of Man exhibited the singular spectacle of an entire community deliberately engaged in "the smuggling *Trade*," as one of themselves naïvely called it. So conducive was it to the pecuniary interests of Manxland, and so correspondingly injurious to those of Great Britain, that early in the eighteenth century the annual loss to the revenue of the imperial kingdom amounted, on the lowest estimate, to several hundred thousand pounds, and many rated it at half a million sterling.[2] Such a state of matters could not be tolerated by the British Crown. One of her dependencies had been openly converted into a nest of plunderers who intercepted her revenues, defrauded her honest merchants, and demoralized her people. Nor, as compensation for this, could it be shown that the native Manxmen were real or permanent gainers by their illicit traffic. All authorities agree in affirming that by far the larger share of its profits fell into the hands of strangers.[3] In 1726, accordingly, an Act of Parliament was passed,

[1] The Dirk Hatteraik of Scott's *Guy Mannering* is a picture from life of one of the Dutch smugglers who long held his own against desperate odds in the Irish Sea. Not less daring were the French, Irish, and Welsh buccaneers.

[2] Train's *Isle of Man*, vol. ii. p. 319.

[3] *Ibid.* p. 308.

authorizing, as it was phrased, the Earl of Derby to dispose of his Manx royalty and revenue, and empowering the Lords of the Treasury to purchase them from him. The Earl, however, had no wish to sell his birthright, and succeeded in putting obstacles in the way of the sale, so that he died in possession.

The lordship of Man now passed to the House of Murray (1736), represented by the Dukes of Athol, the second of whom succeeded the last Stanley. Whether the Duke would have been in any degree successful, had he tried to abolish smuggling, may well be doubted, but he made no attempt towards doing so. On the other hand, as if to incense Great Britain still farther, he signalized his accession to the lordship by sanctioning the passing of a Tynwald Act, which practically prevented any sojourner in the island from being prosecuted for debts incurred in England or abroad.[1] A more unpatriotic act was never passed, yet it must have been recommended to the Duke by his Manx councillors, for he was a perfect novice in Manx law when he sanctioned this statute (1736), along with thirteen others. Through the self-denying and unwearied labours of the apostolic Bishop Wilson, the temporal and spiritual condition of the island was rapidly improving, in spite of the demoralizing influence of the illicit traffic, when this Protection Act, as it was afterwards called, "rendered Man," in the words of its historian, "for nearly a century afterwards, the sanctuary of the unfortunate and profligate of the surrounding nations, who flocked thither in such numbers as to make it a common recep-

[1] Train's *Isle of Man*, vol. i. p. 239.

tacle for the basest of their kind.[1] No doubt the flocking was limited chiefly to the seaports, but it tainted the whole island more or less, and the honest and the upright were involved in the stigma which the protection of fraudulent debtors, and other knaves, brought upon the Manxmen as a people.[2] The Duke, however, who passed this act, not only succeeded in retaining possession of the island during his lifetime, but was furnished by the coronation of George III. in 1761, with an opportunity of doing homage to the king for the lordship of Man; and as his services were accepted, he was reconfirmed in his rights and privileges as Lord of Man. But when he died, three years after, and was succeeded by his son-in-law, the third Duke of Athol, who, in right of his wife, became possessed of the Isle of Man, the Lords of the Treasury lost no time in pressing for its sale (1764). They significantly hinted, at the same time, that as Government was determined to put down the Manx system of smuggling, another mode of dealing would be adopted if the Duke did not accept their terms. He temporized for a while; but as within a year a bill was brought into Parliament to abolish "the clandestine and illicit trade carried into and from the Isle of Man," which threatened to strip him, without any remuneration,

[1] Train's *Isle of Man*, vol. i. p. 239.

[2] Sir Walter Scott's allusion to the condition of the island at this time, in the introduction to *Peveril of the Peak*, is not more favourable; and, from all the accounts of its demoralization, one is tempted to think that the bitter satire passed upon the Isle of Man two centuries before, must have been prophetic of the time we are considering:

"When Sathane tried his arts in vaine,
Ye worship of ye Lord to gaine,
Ye yird, he said, and all be thine
Except ane place, it maun be mine.
Though bare it is, and scarce a span,
By mortals called ye Ysle of Man;
That is a place I cannot spare,
For all my choicest friends are there!"

—Irvine's *Historiæ Scoticæ Nomenclatura*. Edin. Edit., 1682. Quoted in Train's *Isle of Man*, p. 30.

of his Manx possessions, he came to terms. According to these he sold the island in 1765 for £70,000, and an annuity of £2000, but reserving certain rights to his duchess and to himself, and to their successors. He was succeeded in 1774 by his son, the fourth Duke of Athol, and last Lord of Man, whom these reserved rights brought into collision both with the Manx Legislature and the English Government. These disputes were, after many struggles, partially compromised in 1805, "by an additional grant of £3000 per annum to the Duke and his heirs for ever;" and finally, tired of continual conflicts with his refractory Manx subjects, he "made a complete surrender into the hands of Government of all his rights," for a sum of £416,000, and the privileges of lordship passed to the British crown. This was in 1829. The opprobrious protection-act had been repealed in 1814 (the year before Edward Forbes was born); and the unprincipled fugitives, who threw a stigma on the island, made haste to flee to other refuges. A fatal blow had been dealt to the smuggling interests by the partial sale of Man in 1765; and finally, though by slow degrees, its illicit traffic was reduced to insignificance.

The insular Legislature was, from 1765, allowed to enact laws as before, with only the proviso that they must be sanctioned by the King or Queen Regnant, before they are published at the Tynwald Court as statute law.[1] No rights, indeed, except the supposed "right of doing wrong," was taken from Manxland; it retains privileges possessed by no other part of the United Kingdom, and signally profits by them. Yet we cannot wonder that

[1] Train's *Isle of Man*, vol. i. p. 249.

upright patriotic Manxmen, to whom neither exciseman nor creditor had ever been an object of alarm, should wish that it were still, as of old, the Kingdom of Man, not one of the islets of Great Britain. So thought Edward Forbes,—and here, better than elsewhere, I may quote a song, although it is not one of his best, which I have found among his papers, bearing date 1833, when he was in his eighteenth year:—

I.

Oh! lament for the days that are past and gone,
When the sun of glory bright,
On the fairest isle of the ocean shone
With freedom's holy light;
When the golden ship on a field of red,
Beamed forth on the flag of the free,
And the king of the green land bowed his head
To the king of the ocean sea.

II.

Would the Saxon dare to draw his brand
Were Orry with us now?
Would the Albion dare to lift his hand
Were the crown on King Olaf's brow?
But in the sleep of death they lie—
Their glory has passed away—
And the children of their chivalry
A Saxon king obey.

III.

Oh! where was the blood of the kings of old,
When Athol sold his throne?
When our chieftain bartered his rights for gold,
Was this like Orry's son?
Our isle is still as bright, as fair,
Its sons are still as free,
But a stranger monarch reigneth there,
On the throne of the Kings of the Sea.[1]

With this song none but Manxmen need pretend to sympathize. Patriotism is an instinct of all races, al-

1 The preceding historical sketch will render all the allusions in the song intelligible, except that to King Olaf. Three kings of that name ruled in Man, the first a grandson of Orry's, the others Olave I. and II., of another and later

though it becomes active only in the nobler ones; and the patriotism of individuals identifies itself with the visible objects within the horizon of their cradle or dwelling-place, concentrating itself upon a mountain or a chain of hills, the river-bed of a solitary green valley, or the streets and spires of a simple town. The native of a small independent island has this advantage over the native of a vast continent, that he can compass in imagination his whole fatherland, and, if need be, die sweetly and decorously for a larger country than was ever realized as theirs by the subjects of the Roman Cæsar or the Russian Czar.

The Isle of Man is but a small fatherland, yet it is rich in historical monuments and in natural beauties to a degree few regions of similar extent are, and it quickly persuades settlers in it from other regions to rejoice in the title of Manxmen. To Edward Forbes its natural charms were of more interest than its architectural ruins or archæological remains; but, in truth, the time-honoured monuments of a country, which have been witnessed from early childhood, side by side with its great natural features, are unconsciously identified with the latter, as if they were part of them. The fortress, and the rock on which it stands, have been where we see them ever since we remember together constituting what seems a natural whole, and as such giving a character to

dynasty. The last, known in Manx history as Olave the Black, is perhaps the most famous of the three, and probably the one referred to in the song; but the second, Olave the Dwarf, was also a man of mark. It would be quite in keeping with the author's pleasant whims to leave the Manx reader to choose which Olaf or Olave he pleased, or to include all three. See, in reference to these rulers, the second volume of Train's *Isle of Man*, and the catalogue of Kings and Bishops in Cumming's *Story of Rushen Castle*.

the landscape. Some notice, therefore, must be taken of the historical monuments of Man. They abound in every corner of the island. "It has within itself," says Mr. Cumming, "more antiquities in the shape of cromlechs, stone circles, crosses, ruined churches, and castles, than any other of like extent in the British Isles."[1]

Of these antiquities, the most generally interesting are Rushen Castle, Peel Castle, and the Tynwald Hill. Rushen Castle, near Castleton, the capital of the island, and situated near its southern shore, is a considerable fortress, founded, according to tradition, about the tenth century, by the famous King Orry. To Manxmen it is dear as having been the palace of their ancient rulers, and the House of Parliament of the estate of the realm. Beyond Manxland it is interesting from having figured in the Great Rebellion, and perhaps not less from the prominence assigned to it in one of Sir Walter Scott's most popular fictions. In Peveril of the Peak, Lord and Lady Derby, as King and Queen of Man, and Colonel Christian as the judicial victim of the latter after she was made a widow, besides many imaginary persons, are associated with the fortunes of Rushen Castle in the days of the English Stuarts. This Countess of Derby, Charlotte de la Tremouille, is famous in history for her heroic and successful defence of Latham House against the Roundheads. Her husband James, the seventh Earl of Derby, a brave soldier and devoted Royalist, held Rushen Castle for the king till shortly before the battle of Worcester, when he joined the cavaliers in arms in England for Charles II. Soon after that fatal fight, he was taken prisoner and

[1] The *Story of Rushen Castle*, Introduction, Note, p. 1.

beheaded as a traitor. Manx Royalists regard him as a martyr worthy to rank beside the martyr-king.

A martyr of an opposite complexion is presented by Colonel Christian, who, after the Earl's death, surrendered Rushen Castle to the Parliamentary troops, and gave up the Countess and her children as prisoners. After the Restoration he was brought to trial by the Countess of Derby, notwithstanding the general pardon proclaimed by Charles II.; was condemned to death, and shot publicly. The Countess justified herself by the bold plea that the King of England's pardon did not cover treason to the Lords of Man, but her subjects did not sympathize with this mode of vindicating the independence of Manxland. In popular estimation, Christian was a martyr in the cause of liberty. Iliam Dhone, *i.e.*, the fair-haired William, is the Wallace of Manxland, and the maidens still sing, in their ancient Celtic tongue, a lament over his untimely fate.

Peel Castle lies on the east side of the Isle of Man, about eight miles distant from Rushen Castle. It is now in ruins, but so long as Man was a separate kingdom or principality, it was a fortress reputed impregnable. At the present day, its dark and crumbling walls form a striking object in the landscape, and history and romance have combined to render them memorable. They occupy a small rocky islet, converted by an artificial causeway of modern erection into a peninsula. The outer walls of the fortress embrace an area of some two acres, within which, besides the castle proper, are the ruins of four very ancient churches, one the Cathedral of St. Germanus, first bishop of "the most ancient existing

see of the British Isles," and another, the still older church of St. Patrick. The centre of the walled area is occupied by the grass-grown remains of what is supposed to have been a Danish square fort, and beside it, on the summit of the islet, stands a tall Round Tower, similar to those found so abundantly in Ireland. Other architectural relics, ecclesiastical and civil, of unknown antiquity, are crowded within the castle walls; for St. Patrick's Islet, first as a place easily defended, and afterwards as one rendered sacred by its churches, seems to have been regarded by the ancient Manx builders as a peculiarly suitable site for important edifices.

Peel Castle is much older than Rushen Castle. The ruined cathedrals carry us back at least to the fifth century, and the introduction of Christianity into Man; and ruins still more ancient survive from pre-Christian times. Traditions, coeval with the buildings, record their fortunes, and form an important part of the mythical and actual history of Man.

In later times, the kings of England occasionally employed Peel Castle as a state prison. Earl Warwick, the king-maker, was consigned to the dungeons for a season by Richard II.; and the haughty Duchess of Gloucester, Shakspere's "presumptuous dame, ill-nurtured Eleanor,"[1] banished to the Isle of Man by Henry VI. for witchcraft, wore out a lengthened captivity within its walls. Death at length released her from bondage, but, according to a tradition current for centuries, she nightly rose from her grave as midnight tolled, and her troubled spirit was seen gliding along the battlements,

[1] Second Part of *King Henry VI.* Act I. Scene II.

or gazing intently from a watch-tower till cockcrow announced early dawn.

Peel Castle was haunted by another ghost, more familiar to most readers than the "extravagant and errant spirit" of "that proud dame, the Lord Protector's wife." This was the *Manthe Doy* or *Moddy Dhoo*, "a fiend or demon in the shape of a large, shaggy, black mastiff," which paid a nightly visit to the guard-room of the Castle, and retreated by day into one of the ruined churches within its walled area. It was one of the favourite apparitions of Sir Walter Scott. He makes, rather than finds, occasion in Peveril of the Peak (vol. ii. chap. 5) to bring in from old Waldron, the loving chronicler of the superstitions of Man, the legend of a soldier dying speechless and terror-stricken after a wilful rencontre with the demon-dog. In the Lay of the Last Minstrel, also, Deloraine is compared to him

> "Of whom the story ran
> That spoke the spectre-hound in Man."[1]

About three miles from Peel, towards the centre of the island, stands, in a valley, the Tynwald Hill or Mount. It is a circular mound, some twelve feet high, consisting, according to tradition, of earth originally brought from each of the seventeen parishes of the

[1] Waldron's legend, in all probability, would never have passed beyond the bounds of Man, but for the interest it excited in Sir Walter Scott. And he has done more for Peel Castle than merely preserve the memory of its spectre-hound. The characters in Peveril of the Peak are, for most English visitors to the Isle of Man, more vivid realities than the historical personages whom its chronicles name. They are such, in some respects, even for Manxmen. The Manx cicerone shows the stranger the very sallyport through which Julian Peveril and Fenella issued when they left the Castle. Scott's imaginary elfin has dispossessed Dame Eleanor of her historical as well as her ghostly connexion with its walls. Fenella, indeed, is as truly the *genius loci*, in English eyes, of Castles Rushen and Peel, as Hamlet is of that of Elsinore.

island. This earth has been so built as to form platforms or ledges, which encircle the mound, except at its eastern side, where a flight of steps cut in the turf gives access to each of the platforms and to the summit. The whole hill is covered with grass, and was once surrounded by a ditch and rampart. The name of this mount, Tynwald, is believed to be derived from the Scandinavian *Thing*, signifying the Hill of Justice or Mount of Assembly.[1] For eight centuries or more, the inhabitants of Man have assembled once a year, or oftener, on this turf-clad forum, the king or lord sitting "on a chaire, covered with a royall cloath," the officers of state ranged round him on the platforms according to their rank, and the commons "standing without the circle of the hill," and spreading over the valley. Even at the present day, though Man has lost both king and lord, there is annual proclamation made of all the laws which have been passed during the year, nor is a statute of Queen Victoria's held binding in the Isle of Man, till it has been thus proclaimed in Manx and English.

The Tynwald assembly is remarkable as a Scandinavian institution cherished among a Celtic people. It is, however, but one among a multitude of tokens of the struggles which the island has witnessed between conflicting races and opinions. On all sides such memorials

[1] "Tynwald, written in the chronicles of Rushen, *Tingvalla*, is the *Thingvöll* of Iceland, the Danish *Thingvöllr* (pronounced *Tingveuller*, the *eu* sounded French fashion), the 'Fields of the Judicial Assembly.' The term 'thing' is a Scandinavian equivalent of the Saxon 'mote' and appears in our modern word 'hustings.' Some have derived the term 'wald' from the Danish *vold*, a 'bank' or 'rampart,' and have connected it with the 'fencing the court,' as it is called, before proceeding to the business of the 'thing' or assize. The Danes have left the name of Tingwall in the Orkneys and in Cheshire, and of Dingwall in Ross-shire."—*The Story of Rushen Castle*, by the Rev. J. G. Cumming, p. 7.

abound. Glen Darragh, with its so-called Druidical circle of stones—a diminutive Stonehenge. Kirk-Braddan, with its sepulchral crosses and ancient tombs, lying beside more ancient Runic monuments, in the shadow of dark foliaged trees. Ballasulla, or Rushen Abbey, the last monastery which fell at the Reformation. Gloomy Kirk Mallen, with its carvings of old kings. The archaic *crossag*, narrowest of bridges. The vestiges of St. Bridget's cells, and the succeeding nunnery, whose prioress held baronial courts, and was temporal as well as spiritual ruler of her vassals. The roofless walls of Kirk Trinian, whose great antiquity may be measured by the unusual size of the trees which have usurped its aisles. The Holy Spring of St. Manghold, blessed with mineral virtues, to which for centuries pilgrimages have been made. The ordeal rocks, on which nuns suspected of breaking their vows had their innocence tested, or rather their guilt prejudged. Slieuwhallin (the Hill of the Dog), with its smooth slope, stretching a thousand feet, down which, from the summit of the hill, *convicted* witches were rolled in barrels stuck full of spikes.

These are but some of the memorials which crowd the Isle of Man, standing side by side, though representing different ages, like the uncontemporaneous events which are recorded in the same page of an almanac.

The people of whom these memorials are relics were men of different races. When the Isle of Man first dawns upon history, it is apparently occupied by an offshoot of the Irish branch of the great Celtic family. As time goes on, Icelandic, Norwegian, Danish, Welsh, Irish, Scottish, and English sea-rovers in turn, or together, in-

vaded and occupied it. In later times, also, as we have seen, it attracted religious and political refugees, besides smugglers and debtors, from the neighbouring kingdoms, including France and Holland, so that on its limited area many races have met and mingled their blood. Among those, therefore, entitled, as born in the island, to the appellation of Manxmen, even when their forefathers have been residents in it for several generations, there must often be great differences in lineage, although their common employment of the Manx language may conceal this. Whilst the word "Manxman," therefore, has in one respect as wide a meaning as Englishman, it specially denotes the descendants of the ancient Celtic inhabitants of the island, who have in successive generations occupied the island for probably a thousand years. They are still to be found in upland farms and sequestered nooks, a simple, primitive, intensely superstitious, but kindly people, marrying among themselves, and keeping aloof from other races. Unlike their Irish ancestors, they have no written literature, except, in later times, a few translations, as of the Bible, executed at the instance of Englishmen. Like the Scottish Celts, however, they have transmitted by oral tradition the legendary history of their race from remote generations, and their faith in the supernatural is unbounded. Sir Walter Scott, who had studied the superstitions of all classes of his countrymen, declared that "tales of goblins, ghosts, and spectres, legends of saints and demons, of fairies, of familiar spirits, in no corner of the British dominions are told and received with more absolute credulity than in the Isle of Man."

Supernatural beings, indeed, are for these primitive Manxmen realities so certain, that they will not cross their thresholds after dark, unless in company, lest they fall into the hands of malignant demons. In stormy winter nights they retire early to rest, leaving their turf-fires burning, that the shivering fairies may gather in peace round the hospitable hearth. In medicine, as practised by surgeons or physicians, they have no faith. The sufferers from cholera in 1832, were treated only by charms, and plants of alleged mystical virtue; and when small-pox was making great ravages in the Isle of Man in 1837, the people in general refused to allow their children to be vaccinated. To University graduates they prefer a race of home-bred practitioners, called *Seers*, whose functions exactly correspond to those of the medicine-men of the Red Indians. Till one of these Seers has blessed his seed-corn, the farmer will hardly sow it, however propitious the weather may be. When the benediction has been omitted in Spring, and in consequence, as the Seers teach, the Autumn produce of the unblessed seed is devoured by sparrows, the Manx medicine man is sent for to exorcise them. So late as 1833 these proverbially self-asserting little birds were seen by Manxmen to draw up at the edge of the charmed field, which they had formerly ravaged, and content themselves with gazing wistfully on the tempting grain! The Seer who thus controlled the sparrows found no difficulty, when the potato disease visited the island, in preserving in a state of vigorous vegetation every tuber intrusted to his care. He was able to do this, according to his own account, in consequence of his knowing that the disease of the

potato was occasioned by the malevolence of the fairies, for whom he was more than a match.

The Manx seers, however, are in some respects excelled in power by the Manx witches, who, in spite of them, injure and often kill cattle and horses. Such, at least, is the lingering faith of the island. Even so recently as 1844, a poor woman was not only tried before a Manx jury for bewitching her brother-in-law's cattle, but was deliberately interrogated on oath, as to whether she had "ever come in any shape or form," to do her brother-in-law or his goods any injury.

Whilst the trial was proceeding, some wag made an experiment on the credulity of the jury, by suddenly letting loose a wild rabbit in the court-room. A scene of great panic and confusion ensued, accompanied by cries of, "The witch! the witch!" which only ended when a spectator, more daring than his neighbours, seized the harmless creature and killed it, triumphantly exclaiming, "You shall not trouble Q— [the owner of the bewitched cattle] again!"[1]

Credulity and superstition as great may, doubtless, be found in many other districts of Great Britain, but the acknowledgment of this will not relieve Manxmen from the charge of being, like the ancient Athenians, in all things too superstitious.

It would seem, indeed, as if the lingering remnant of the cloud of supernatural beings, grim or gentle visitants from Demonland or Fairyland, who once roamed at their will over Europe, now, as one by one, from shore after

[1] Train's *Isle of Man*, vol. ii. p. 170. Train's account is abridged from the *Mona's Herald*, Jan. 10, 1844.

shore, "the parting genius is with sighing sent," delay their return to Spiritland for a brief season, among the credulous and kindly peasants of Man.

Besides those weird companions, the Manxmen cherish certain strange flesh-and-blood creatures, which afford additional proofs of the isolation of their home. Of these the least familiar to strangers are the *loaghtyns*, a diminutive breed of brown-fleeced sheep, now nearly extinct; and the *purrs*, an odd-looking race of pigs, which are also dying out. Much better known than either, and possessed of undiminished vitality, is the singular tailless cat of the island, with long hind-legs, like those of a hare or a rabbit, and awkward, slouching gait, compatible, however, with very nimble though ungraceful movements. When the breed first appeared in the island, or how it originated, is unknown. It threatens to become scarce, in consequence of individuals being carried off from the island as curiosities, whilst cats of the common breed are introduced in their place. Crosses between the two breeds readily occur, presenting all kinds of modifications between the contour of the parents, especially conspicuous in the dimensions of the tail and hind limbs.[1]

[1] Edward Forbes says of this animal:—"The only remarkable quadruped peculiar to the Island, and of which it can boast, is the tailless cat, an accidental variety of the common species, *Felis Catus*, frequently showing no traces of caudal vertebræ, and in others a merely rudimental substitute for it."—Quiggin's *Guide to the Isle of Man*, chap. iv., which was written by Mr. Forbes.

A Manx tradition represents the progenitors of these odd cats, as having been landed from one of the ships of the Spanish Armada, wrecked on the southern shore of the Island; but it is only a tradition.—Cumming's *Isle of Man*. Train, who is no naturalist, however praiseworthy a historian, propounds the monstrous doctrine that the Manx cat is a cross between a common cat and a rabbit! and gravely supports this proposition by the statement, that, within his knowledge, tailless rabbit-cats originated in this way in the neighbourhood of a warren in Galloway.—Train's *Isle of Man*. It

I have reserved to the last the consideration of the physical aspect of the Isle of Man, as that which most influenced Edward Forbes. The most distinctive features in Manx scenery, in addition to the architectural memorials already referred to, are the mountains, the glens, the sea-cliffs, and the shore bays.

From north-east to south-west, down the centre of the island, runs a mountainous ridge, along which occur, at irregular distances, gigantic knobs or bosses, rising to more than a thousand feet above the level of the sea. Chief among these stands, at double that height, Snaefell, verdant to the summit, in spite of its Norse name, signifying mountain of snow; and at either end of the chain are North and South Barrule, apple-shaped hills, as the name implies, the former lower than Snaefell by only 150 feet, the latter rising to 1500 feet above the sea-level. Besides those lofty domes which, even when least rounded, rise into cones rather than peaks, lowlier eminences stud the island, except at its northern extremity. Here the Curragh, extending for fifty square miles as a grassy plain, in some places fertile as a garden, in others an unfruitful swamp or peat-moss, approaches to within sixty feet of the sea-level. Beyond this, towards the

is wholly needless to criticise this incredible story; and as for the confirmatory fact which he alleges that the female Manx-cat never breeds, every Manxman will smile at it! I can myself disprove it, but special proof is needless.

The Manx cat is every inch a cat, not a cat-rabbit, or a rabbit-cat, but simply a cat. It is not a common cat without a tail, but such a cat with a compensation for the missing member in long hind limbs, and in slighter modifications visible to the anatomist in other organs, according to a well-known law recognised by naturalists. Though not so graceful or easy in its movements as the common cat,—which has more symmetrical limbs, and a tail which serves the purpose of a rudder in guiding or balancing its body whilst in motion,—the Manx cat is a better leaper, in virtue of its long hind-legs. A male and female were in my possession at different periods, for many months, and I can testify to their exhibiting in perfection all the feline virtues and vices.

north, an undulating ridge of mounds, forming the Hills of Kirkbride, poorly repeats the giant chain of the south, and ends in a waste of sand and gravel, which, barely clear of the waves, stretches northwards to the Point of Ayre.

All the hills may be climbed without difficulty, and all will repay the labour of ascent. None rewards the climber more than Snaefell, or brings into view a grander and more varied panorama. On its green summit, the spectator, lifted two thousand feet above the sea, stands, as it were, in the centre of the British Isles, and on a summer day looks down upon three thousand square miles of land and ocean. Skiddaw and Snowdon, Criffel and the hills of Morne, greet him from England and Wales, Scotland and Ireland. The lesser eminences and lower grounds on the distant mainlands, with their endless diversities of hill and dale, and their shifting shadows, recede in long perspective towards the horizon, whilst the nearer points, mapped out in bird's-eye view, are seen as the eagle sees them. Between the visible shores spreads the blue sea, studded with ships of all nations, and dotted near the land with fishing-boats, hovering like birds over their prey.

At the feet of the spectator, the island unveils at the same moment every object on its surface—wild heath-covered hills, the haunts of fairies; romantic glens, with their babbling brooks, flashing like silver between the trees that bend over them; rude hamlets; fishing-villages; busy towns; rural palaces; ancient churches; war-worn castles; ruins older than history; lighthouses sleeping in the sun till their hour of night watch re-

turns; harbours busy with the stir of sea-faring men; and the shore visibly widening and contracting as the tide ebbs and flows.

These, and a thousand other items which the eye perceives in a moment, but which the memory cannot recall, unfold themselves to the spectator gazing from the Manx hills; and though none of them commands so extensive a horizon as Snaefell, the view from each is similar in nature and variety. The hills themselves, though in general outline conical or rounded, are rent at their summits into dark chasms and picturesque ravines. These open out into valleys; or change, as they descend, into glens of great beauty, through which pleasant streams find their way to the sea.

Large valleys intersect the mountain-chain, with farmsteads and pretty villages at intervals among them, and though masses of wood are wanting, and trees of large size do not abound, the beech, the alder, the fir-tree, the elm, and sometimes the arbutus and the myrtle, are clustered round the cottage homes. Wild flowers do not show themselves in great diversity, but such species as do occur are scattered in profusion; the sides of the hills are golden with gorse at one season, and purple with heather at another, and the grass is as green as that of Ireland.

The glens which hide their quiet beauty among the hills of Man, have a certain soft and subdued grace, which distinguishes them from the wilder glens of the Scottish mountains. They consist, in general, of ravines mantled by deep green woods, hung with ivy, and carpeted on their sloping sides by velvet mosses and fra-

grant thyme, which are kept verdant and full of life by the plash of a mountain stream tumbling from crag to crag, refreshing the sward and filling the air with its music. There is frequently sufficient height of cliff and volume of water to give rise to a cascade, and, where the stream is of some breadth, a rustic mill, with its water-wheel and cluster of homely cottages, adds its picturesqueness to the scene.

These inland valleys lead down to the wildest shores, along which, however, peaceful bays are not wanting. Between sunrise and sunset of a midsummer day, a steamer of moderate power can easily make the sea-tour of the island. The spectator from its deck, gazing on the shifting scene, feels as if he were at rest and the land revolving before him. Now it shows a desolate shore, such as spreads its barrenness round the Point of Ayre; and then the eye is refreshed by the green Curragh and the grassy mounds of Kirkbride. Picturesque headlands, such as Manghold or Bradda, Bankshow or St. Anne's, slowly pass by. The basaltic shafts of Scarlet Point project their shadows on the distant hills. From the crags of the Calf, the white-breasted sea-birds, perched hundreds of feet above the waves, ascend in clouds, filling the air with their clang. Out of the sea rises Spanish Head, one of the ocean gravestones of the wrecked Armada, and of many a goodly ship which has sunk beneath its frowning brows. Near it are the kindred rocks, emphatically called the Chasms, turning, as they pass, their yawning mouths towards the gazer. Along its entire line the southern coast is guarded by weather-worn cliffs, whose riven ledges and torn and ragged

sides are sharpened into needle-like pinnacles above, and wasted into resounding sea-caves below.

Between curving headlands,—embracing them in their arms—havens, peacefully embayed, come into view in rapid succession. Such are the Bays of Ramsay and Castletown, Derby Haven and Port Erin, and, most beautiful of all, Douglas Bay. With its unusually transparent waters, it lies embedded, like a crescent moon, in the south-west shore of Man. The tip of either horn is a headland, the southern one crowned by a lighthouse. As it flits past, the crescent opens, and reveals all the objects which it defends from the open sea. In the centre of the bay a peculiarly picturesque tower of refuge stands on a reef—a beacon and shelter for the sailor. On the south-western curve of the crescent lies the town of Douglas, dear to us as the birthplace of Edward Forbes. Its foundations are laid in the delta of a small river, but it has climbed the heights encircling the bay, and spread itself gracefully over the gentle terraces and broad undulations which overlook the sea. The more striking eminences are occupied by stately castellated buildings; and behind all, the lofty domes of Snaefell and the sister hills stand in array against the horizon. And—besides sand and fen, headland and haven,—here and there, as the island passes before him, valleys opening on the sea allow the spectator to gaze far inland. The brooks that make them green are seen glittering in the sun, with the flicker of the leaves whose shadows mottle their waters. The white smoke of hidden cottages rises like a veil in front of the purple hills. The fragrance of wild-flowers comes down the

breezes, the tinkling of sheep-bells, and the low murmur of distant waterfalls. An island so varied and so beautiful was the befitting birthplace and cradle of one destined in future life to prove himself alike Naturalist, Artist, and Philosopher. Whilst yet a child, the wild plants of its valleys had made him a botanist, and the spars and fossils of its shores had taught him something of Geology. But the sea had the chief charm for him, and in the bays of Douglas and Ramsay he caught, whilst yet a youth, the first glimpse of those ocean revelations which have made him famous.

CHAPTER II.

INFANCY—CHILDHOOD—YOUTH.

EDWARD FORBES was born in 1815 and died in 1854. The years of his life were thirty nine: the years of his public labours, as nearly as may be, twenty-five. Into that quarter century he crowded more work than most men accomplish, even when their span of days stretches beyond the allotted three-score years and ten; and yet his work was but half done. He was cut off in the midst of his days, with his powers, so far as others could discern them, but partially evolved, and his purposes but half fulfilled, so that he never can be more in the hands of a truthful biographer, however skilful, than a magnificent torso, which, had it pleased the Great Artificer to continue his work in this world, would have grown, we do not doubt, into a noble statue, but after a model which we can only conjecture.

He was born at Douglas in the Isle of Man, on February 12th, 1815,[1] and was the second and eldest surviving child of Edward Forbes, Esq. of Oakhill and

[1] The Rev. John Cannell, incumbent of St. Matthews, Isle of Man, has favoured me with this extract from the registry of the chapel:—'Edward Forbes, the son of Edward Forbes and Jane Tear, baptized the 12th of February 1815.' There is no registration of his birth, but it took place on the day entered as that of his baptism.

Croukbane near Douglas, and Jane, eldest daughter and heiress of William Teare, Esq. of the Corvalla and Ballabeg, Ballaugh, Isle of Man.

His great-grandfather, David Forbes, "second son of Forbes of Thornton, the first cadet of the family of Sir John Forbes of Watertown," was born in 1707. He was implicated in the Jacobite troubles of 1745, and took refuge for a season in the Isle of Man. He married a Miss Quirk, whose Christian name and lineage are unknown, and died in Edinburgh in 1771. His only son, Edward, settled in the Isle of Man, where he acquired the property of Oakhill, and married, in 1784, Alice, daughter of — Holland, Esq. of Manchester, by whom he had fourteen children. This lady brought her husband a considerable fortune, but much of it was lost in loans to the refugees, who then swarmed in the island. He died in 1811.

His eldest son and namesake, born 1786, was originally connected with the fisheries and timber trade of the Isle of Man, but ultimately devoted himself entirely to banking. He married Miss Teare in 1813, and by her had nine children. The eldest, named Edward, born in that year, died in infancy, and his name was given to the second child, the subject of this memoir, whose birth occurred two years later. Miss Teare belonged to an old and esteemed Manx family, believed now to be extinct. She died in 1836.

The immediate paternal ancestors of Edward Forbes were most of them, as I learn, characterized by great activity and energy. The men, in particular, were fond of travel, fond of society and social pleasures, freehanded,

and better at spending than at saving money. His grandfather was for some time at sea, in command, I believe, of a merchantman. One uncle died in Demerara, another in Surinam, a third travelled into the interior of Africa, and was last heard of some twenty or thirty years ago, as king or sultan of a native tribe. One brother of Edward's perished by drowning in Australia; another was accidentally killed in America; a third, the only surviving son, David, who resembles Edward in genius, and is one of the best field mineralogists and metallurgists of the day, has seen many adventures in Norway, and has visited all the mining districts of Europe. Whilst I write he is exploring the mines of South America. A love of roving certainly runs in the blood of the Manx Forbeses, and in none of them, as we shall presently see, was it stronger than in Edward, whose happiest hours were spent in travelling through strange lands, and dredging in unfathomed seas.

Of his maternal ancestors I cannot tell much, but his mother, by the universal testimony of all who knew her, was a singularly gentle, amiable, and pious woman, devoted to her children, and beloved by rich and poor. She was not, in the conventional sense, accomplished, for in her early days the provisions for educating both sexes, but especially hers, were very scanty in the Isle of Man; but she possessed a natural refinement and good taste, which, besides other manifestations, showed itself in an almost passionate love of flowers, and enabled her to sympathize with her children's literary and artistic pursuits. She inherited her love of flowers from her mother, and transmitted it to her son, the future Professor of

Botany; and it was from her, I imagine, that he mainly derived the preponderant ideal and æsthetical elements of his nature. It will be seen, however, that he was of variously-mingled blood, his great-grandfather being Scotch, his father's mother (and perhaps grandmother) English, his own mother Manx. This descent probably went for something in giving him his striking physique, which was neither English, Scottish, Irish, Celtic, nor Teutonic; and perhaps, also, contributed to that catholicity of character which kept him, though proud of being a Manxman, free from all insular narrowness of feeling, and made him a favourite wherever his wanderings led him.

The childhood of Edward Forbes was in many respects a happy one. His father's affairs for a long season were prosperous. His mother also possessed property in her own right, which by Manx law was under her control; and as he was the eldest surviving and the favourite child of both his parents, no hampering pecuniary restrictions were laid upon him in his early days. He remained in his father's house till 1831, when he had reached his sixteenth year, and it was thought time to select a profession for him. His mother wished him to be a clergyman. His father wished him to be a physician; his own desire was to be a naturalist; but with consent of all parties a compromise, curiously illustrating his versatility, was entered into, and he was sent to London to become a painter. The compromise failed of its purpose, but he did not again make the Isle of Man his residence except at vacation intervals, so that we may now look back at his Manx life as forming one natural epoch, extending

from 1815 to 1831, including his infancy, childhood, and youth, and ushering in his trial of the Fine Arts as a profession.

In now attempting to review these early days, I am reminded that the besetting sin of a friendly biographer is to overpraise the subject of his sketch, and in particular to magnify the promise of his early days. So much has this been recently insisted on, that more than one able biographer has industriously laboured, and apparently with great contentment to himself, to prove that his Hero was an uninteresting or even a stupid child, and has been careful in tracing his rise to eminence, to avoid imputing to him any such quality as genius. To the general public this mode of reviewing their intellectual chiefs has naturally been acceptable. It leaves to the clever child his chance of becoming a clever man, and consoles the stupid child with the prospect of becoming a still more clever one; whilst the adult wise, the moderately wise, and the unwise, stand much more nearly on a common level than by any ingenuity they can be made to do, so long as genius is held to be a rare and peculiar gift.

I have no wish to disturb the complacency with which the majority of mankind must regard this doctrine, or to deny that to an ingenious biographer the transmutation of an infant dunce into an adult genius, must be a much more interesting process, than the simple record that the eagle who built his nest among the stars, was but the full-grown fledgling recognised to be an eaglet from the moment that he chipped the shell.

I can find no room, however, for transmutational ingenuity in writing of Edward Forbes. Whether his case

illustrate the rule or the exception, certain it is that from early childhood he displayed remarkable moral and intellectual powers; and if by genius be signified, among other things, intuitive—as distinguished from the merely acquired—power of apprehending and originating truth, then he was richly endowed with genius. But I have no wish to dispute about words. The reality, a twofold one, to which I am anxious to point attention is, that unless my estimate of his character is altogether wrong, Edward Forbes, whilst yet a child of ten or twelve years, had, in the first place, unaidedly discovered the true scope of his intellect, and had begun to employ it systematically on the subjects which engrossed his attention to the end of his days.

Secondly, he had begun to exert an extraordinary moral influence on all who came within his circle, winning the affection or regard of persons the least like each other in tastes and temper, and displaying a power of fascination over others, such as in later life, when it told upon the entire scientific community of his country, made him a man remarkable in his generation, apart altogether from his genius and learning.

It may at first sight appear no rare thing that the pursuits of later life should be shadowed forth in the tastes of childhood, and assuredly musical, pictorial, and all kinds of artistic and mechanical skill, show their bud of promise very early; but a philosophizing, generalizing, or systematizing power is rarely displayed in children, even in those who in maturity are remarkable for it; and if it does exist it is generally too latent to be detected. Edward Forbes, however, had laid out

for himself when very young, and apparently without extrinsic suggestion, a scheme of comprehensive study, which, though in later life it was greatly enlarged, was not essentially altered. This scheme included the following out of Natural History to the full; and if we call it a boy's dream, it was a dream which the boy determined to fulfil, and brought nearer to fulfilment every day that he lived. In spite of all the temptations which literature, art, and social distinction held out to him, to depart from the path which he early discovered was his appointed orbit of progress, his wanderings at farthest were but planetary perturbations, and, traced upon the chart of his life, the outline of his scientific career appears in almost unbroken curves, which, if carried out, would give us a perfect oval. In truth, if we except his false start as an artist, for which his seniors—not himself—were responsible, and exclude his nominal study of medicine, which from first to last was under protest, we shall find him pursuing with astonishing unity and consistency one object, almost from the cradle to the grave. That object was Natural History, understanding by the terms the biological half of natural science, or, in other words, the science of organisms or living things in relation to time, to space, to each other, to man, and to God.

To make this clear it is necessary to enlarge a little on the circumstances of Edward Forbes's early years. His health was delicate in childhood. From his fifth to his twelfth year he was subject to severe attacks of what my informant styles "inflammation of the lungs," but it can scarcely have been the severe pulmonary affection

which, at the present day, medical men recognise by that term. It was sufficiently severe, however, to keep him prisoner to bed or sofa for weeks together, and to prevent his being sent to school till about his twelfth year. Up to this period, accordingly, he lived almost entirely in a small circle of relatives and friends, who greatly loved and admired him, and who left him, almost uncontrolled, to occupy himself intellectually as he pleased. His childhood, in spite of his illness, was a singularly happy one, and shed, as a happy childhood always does, a benignant influence over all his later years. He was tenderly nursed, affectionately ruled, and allowed a wise liberty; but, so far as appears, no relative, friend, acquaintance, teacher, visitor, or distinguished stranger, directed his mind towards natural history.

Nevertheless, all at once, somewhere about his seventh, eighth, or tenth year, we alight upon him as a confirmed naturalist. His father has built for him a museum at his country-house. His sister is installed as curator. His playmates are under requisition to bring contributions from all quarters. Minerals, fossils, shells, dried sea-weeds, hedge-flowers, and dead butterflies, accumulate around him, and hours are spent in arranging and classifying them.

With his twelfth year better health sets in, and he is free to ramble as he pleases. He goes to a day-school, despatches his lessons with a rapidity provoking to his master, who would fain make him a classical scholar, but has no other fault to find with him than that he is constantly drawing grotesque figures on his books, and helps the stupider boys with their lessons. Out of school, he

takes no part in athletic exercises, in boisterous play, or in battle. He quarrels with no one, and no one dreams of quarrelling with him. The other boys, however, observe with surprise that he never passes a stone in the grass without turning it up to see if there are worms or other "beasts" below it. He has an unaccountable fancy for gathering weeds, and filling his pockets with creeping things. A tame lizard has a pocket to itself, and there seems to be a mysterious freemasonry between him and all the cats and dogs he meets. No one, old or young, sympathizes with him in these tastes, or directly encourages them. The servants about him regard what they term weed-gathering and catching flies in the air as proofs of incipient madness, and hint as much to their superiors. His grandmother, though she dearly loves him, and does her very best to spoil him, listens with half assent to these opinions, and denounces him in the Manx tongue, which, however, he does not understand, as prospectively the greatest fool in the Isle of Man. His mother puts religious books in his way, and hopes that he will enter the Church, failing which he shall be an artist. His father looks upon his occupations as boyish pastimes. His teachers lament his favourite occupations, as so much wasted time, and blame his relatives for suffering such busy idleness. His winning ways, indeed, and his manifest genius disarm all opposition, and every one helps him, but the motive in every case is to give him pleasure, not to show the sympathy of the helper with his tastes. Thus, unopposed but unencouraged, he laboured at Natural History till his sixteenth year. And his time was not spent in the mere boyish collection of pretty

shells and shining spars, stuffed birds and gilded beetles. He methodically studied, though necessarily in an imperfect way, mineralogy, geology, botany, and zoology; contrived, no one knows how, to get hold of systematic works on those sciences; and, which is still more strange, read them with profit. A significant order presided over his collections, not the mechanical order which subordinates all to the foot-rule requirements of symmetry, though this in its place he did not despise; nor the artistic order pleasing to æsthetic taste, but the ordination which regards every material object as a link in the magnificent network of created nature, and knows that if lost, it would leave a gap which no other link could fill.

I have diligently sought for indications that some maturer intellect than his own guided him in those proceedings, but with no success. Neither does it appear that any incidental event in his early history did more than provide occasion or opportunity for them. His mother and grandmother were noted in the Isle of Man for their love of flowers, and for their skill in rearing them, and we may willingly believe that a similar love descended to him, and was fostered by their precept and example. He himself, also, more than once, in conversation with the late Captain Graves (on whose authority I make the statement), connected his love for Natural History with the delight which as a sick, bedridden child he received from the shells and sea-weeds which his playmates brought him. It is certain, also, that the green romantic beauty of the valleys of Man, and the picturesque wildness of its shores and sea-bays, told powerfully on his youthful fancy; and that as soon as his health

permitted he took to adventurous boating, like a true Manxman, in whose veins the blood of a Norse sea-king still tingled. But after conceding all this, and yet further, that his special devotion to marine natural history stands in organic connexion with his birth in the small islet which old writers call the "navel" of our seas, how little are we helped by such concessions towards explaining the secret of his precocious philosophizing! Would it prove a moderately successful, not to say infallible, recipe for breeding naturalists to send a clever child to the Isle of Man, lay it on an invalid's couch, bring it flowers, sea-weeds, and shells, and when it grew stronger set it to catch insects and dredge shell-fish in a troubled sea! It may be enough to reply that the experiment has been tried, though unwittingly, a thousand times, and has failed. Edward Forbes is the only naturalist whom Manxland has bred; and we may pronounce the recipe infallible, provided only we have an Edward Forbes to try it upon. Assuredly had he not been brought face to face with the magnificence of material nature in early life, he might have been a great poet, painter, or man of letters, rather than a great naturalist. But looking out on Nature, he did as much to the making of himself naturalist, as Nature looking in through his senses did; and for us, what he contributed is the more interesting element of the two. I would not in the least underrate the influence of outward circumstances upon him; but they must count for far less than the way in which he guided and controlled them; nor can he be quoted against himself as judging humbly of his own capacity. Some men deny genius to Newton, because he gave himself credit only for patience.

forgetting that the patience of Newton was part and proof of his genius. Let us see how far the preceding statements are borne out by the actual testimony of his contemporaries and seniors.

Edward Forbes's first formal teacher was an accomplished lady, Miss Stowell, who thus writes of him in a letter to one of his surviving aunts:—

"DEAR MRS. FORBES,—My recollections of your nephew are almost entirely confined to a few years, and those at an early period of his life.

"The estate to which his mother was heiress being very near Ballaugh Rectory, Edward was often there.

"My uncle was fond of all Mrs. Teare's grandchildren; and as they spent many of their vacations at Ballabeg, both during my uncle Stowell's and Mr. Howard's residence at the rectory, I frequently met them there. Of these little visits I now only remember, that the Forbeses coming to Ballaugh to spend the holidays was a signal for pleasure, and that Edward was a great favourite with my uncle, who always spoke of him as being a boy of unusual intelligence and great promise. Even when seeing him thus casually among other children, I could not avoid observing his great thoughtfulness, and his studious attention to the remarks of those older than himself, whatever might be the subject of conversation.

"No doubt in his rambles among those beautiful glens near Bishop's Court, and in his loiterings on the shores, and scrambles on the rocks of his native island, he first imbibed that taste for the investigation of nature which he afterwards so successfully cultivated.

"When his sister was my pupil I often spent the evening with Mrs. Forbes, and Edward was fond of joining our quiet little party. He seldom took part in our conversation, but always showed by a smile or a certain quiet little frown of his own (which was by no means unpleasing) whether he approved or disapproved of our sentiments. Generally, however, he was so occupied either with books, pictures, or shells, that he seemed scarcely aware that we were in the room.

"With a remarkably deferential manner towards his seniors, he had, at the same time, an openness and independence in speaking his mind that evidently proceeded from conscious integrity.

"I must mention an instance of high principle which struck me as being remarkable in one so young. I think he might have been about fourteen, when his mother told me she much wished her eldest son would study for the Church. Thinking him a seriously disposed youth, and, soon after this conversation, happening to have an opportunity of saying something to him on the subject, he replied to my remark, suddenly but firmly,—'I'll tell you what, Miss Stowell, you want to persuade me to enter the Church. Now, were I to tell you candidly what would be my motives in doing so, you yourself would be the very first person to blame me.' What motives? 'Just that I might have time to paint and study what I liked. And what sort of a clergyman should I be, to swear that I was moved by the Holy Ghost to take upon me that office, which I *chiefly* took upon me for the sake of *leisure*. No! I'll never take money for what I don't intend to devote myself to!' I need not say how greatly I was pleased

at the honesty of the youth. However much one might regret that his choice of studies was not theology, his after life showed that he had not mistaken his calling, but that he was pre-eminently gifted for the path he had chosen; and may he not have been a more useful man in his generation than he would have been had he 'taken orders,' without his whole heart being in his Master's work? But excuse me, I did not mean to add any comment.

"All that I can recall of the late Professor presents him to my mind as a humble admirer of whatever was great or good. He seemed to have an affectionate disposition, remarkably so as son and brother. He was extremely gentle, and had great tenderness of manner, without using many kind words. His tone was generally kind and tender, especially towards his little sister. Whenever her praises were spoken, his eye lost its languor and kindled into brightness, however deeply he might be engrossed in his books or his drawings. He was naturally disposed to silence, but when he did speak there was often a little fun or pleasantry, sometimes, perhaps, bordering on the satirical; yet never did I hear him say anything that was really ill-natured.

"His chief trait at that time appeared to me to be indefatigable industry. I do not remember to have seen him idle; he used to say, 'My lessons are play enough for me.'" . . . .

The Rev. Mr. Howard, Rector of Ballaugh, Isle of Man, a venerable clergyman of eighty, thus writes of young Forbes:—

"When Professor Forbes was quite a boy, there was

something exceedingly interesting in his appearance. A stranger could hardly pass him without turning round to look at him again, so much amiableness, benevolence, and intelligence were expressed in his countenance. He was a general favourite with his school-fellows. There was a great deal of playfulness in his disposition. No one enjoyed more any little witticism than he did, yet he never indulged in any ill-natured remarks upon others.

"When very young he discovered a remarkable fondness for the study of Natural History, and when he was about, I think, twelve years of age, began to form a museum of his own at home, where, in course of time, he collected and arranged a great variety of natural curiosities. In this museum he spent much of his time when he was out of school.

"His mother, who was a person of an intellectual and very superior mind, took great delight in cultivating beautiful flowers and rare plants. And perhaps he may at first have imbibed his early fondness for Botany from the great interest he saw her take in these things. She soon observed in him a more than common turn for scientific pursuits, and was anxious that he should have every facility for increasing his knowledge on these subjects. Had her life been prolonged to witness the celebrity he afterwards attained, what high gratification it would have afforded her to see her most sanguine hopes concerning him more than realized!

"He spent a great part of his school and college vacations in the parish of Ballaugh, at the residence of his grandmother, who, as well as his mother, had a fondness for the cultivation of flowers, almost amounting to a

ruling passion. There he felt quite at home; and it was no small gratification to him that in this retired situation he was able to pursue his scientific studies uninterrupted and undisturbed. His grandmother always left him to spend his time entirely as he thought best. She had a great affection for him, and he had for her. Sometimes she would laugh at him for the enthusiasm with which he prosecuted his Natural History studies, which he always took very good-humouredly. Her gardener mentioned a somewhat amusing observation made by her to him one day. Mr. Edward, he said, had been in the garden amusing himself at his little tricks. He had been for some time playing with flies in the air. After that he pulled up an insignificant little weed, and turned it round and viewed it on all sides. He then went to a hedge, at a short distance, where he began to grope for insects with his long slender fingers, which, to use the man's own words, seemed made just for the purpose. His grandmother, who had been all this time silently observing him, with a very curious eye, turned suddenly to the gardener, and said to him in Manx (a language which Professor Forbes did not understand), 'Ta mee credjal naugh vod slane Ellan Vannin sauail yn guilley shoh veich cheet dy ve ommydan,' *i.e.*, 'I do believe the whole Isle of Man cannot save this boy from being a fool.' One night at the Rectory of Ballaugh, when he was, I think, about twenty-one or twenty-two years of age, he, his cousin, and some of my family had been employing themselves by taking profiles from their shadows upon the wall. One of them said to him, 'We will keep this of yours until you are a Professor of something or other one of these days.' Upon

which, stretching forth his arm and pointing as if to something far away, he said thoughtfully, 'That is far off in the distance.'

"His mother once said to me when he was a boy, and she was at the time speaking with pleasure of his great taste for Natural History, 'My highest ambition would be to see him a good clergyman.' He himself accidentally mentioned at a later period of his life that at one time he had wished to be a clergyman, but that he had thought he knew himself too well to hope that his teaching and his practice would always agree.

"During his visits to his grandmother at Ballaugh, he was in the habit of going out in a small fishing-boat into the Bay, to an oyster-bank three or four miles distant from the shore, for the purpose of dredging for mollusca. One of the boatmen told me that Professor Forbes was very particular about having his microscope with him, and that at one time it had fallen into the bottom of the boat without his being aware of it, and that he, seeing it lying there, had taken it up and quietly put it into his pocket. Some time afterwards Professor Forbes wished to use it, but found it was gone. He did not know what had become of it. 'Oh! what a look of sorrow,' said the old man, 'there was in his face then! I did not tell him for a while that I had got it; but at last I held it up to his view,—and the joy that was there! He directly slipped a shilling into my hand.' The same man told me that Professor Forbes used often to come to see him at his cottage, and happening to find him at dinner, has sat down on a stool beside him, and partaken of his homely meal of fish, with much apparent enjoyment.

This old man, who had known him from his childhood, said to me, 'Oh, he had nothing of pride in him. I never knew a better temper. I do not remember ever to have seen him in a bad humour.'

"His uncle mentioned to me that one day when Professor Forbes and he were together at his grandmother's, the former was examining with the microscope some small marine animals, when he suddenly started up and sprang out of the room. On his return, his uncle inquired the cause of his acting in a manner apparently so frantic, and, his face beaming with delight, he told him he had made an important discovery; that a certain theory had been put forth on the subject, which he had just been examining; that he had always disbelieved it, and now had ocular demonstration of its erroneousness, and was so delighted with the discovery, that he scarcely knew what to do with himself. It reminds one of Archimedes running into the town, crying out *Εὕρηκα! Εὕρηκα!*

"He would pass day after day in a part of the parish of Ballaugh called the Curragh, and in the glens, in search of plants. His uncle said that while he was employed in this way he never felt alone, nor found time hang heavy on his hands. A person who often accompanied him in these excursions remarked, 'He had a hawk's eye to see in a moment any plant that was new.' To this person he presented a beautiful Pictorial Bible as a memorial of their early intercourse. This man said of him, 'He was kindness itself.'

"The persons who accompanied him to the dredging were generally farmers who lived near the sea-shore, and they considered it a great pleasure to go along with him,

and to row the boat, and spend the long summer day in his company. At times some of them would make rather ludicrous observations on the small animals which they found, to which he always listened with a kind smile. He had an agreeable way of imparting to them much scientific information, but in a manner so simple and so free from technical terms, as to be easily comprehended, and interesting even to persons not conversant with such subjects. When he visited the parish of Ballaugh at various later periods of his life, he did not forget old times, but always met his former dredging companions with a truly friendly look, and a hearty shake of the hand. They all had a great regard and respect for him, and were glad to see his face again, as the face of a true friend.

"His humility and simplicity were so observable that no one who knew him could fail of noticing and admiring those lovely features in his character."

Mrs. Melville Attwood, his sister, has kindly favoured me with some notes of Edward's early days, which I add here.

"Edward was principally educated at Mr. Garvin's school in Douglas, until he went to Edinburgh University, but was always most studious at home, and seldom joined in play with his schoolmates. His mother was of a most refined and delicate mind, and her opinion was very highly regarded by all her friends. She always encouraged his taste for the Fine Arts. In respect to his health, I have heard her remark that Edward was of an extremely delicate constitution, having a regular attack of inflammation of the lungs every winter until twelve years of age, when he seemed to outgrow the tendency; and no doubt the

constant change of air he had afterwards, in travelling about the Continent, assisted to establish better health, until he so unfortunately caught fever amongst the Islands in the Archipelago. His father, although generally absorbed in business, encouraged to the utmost of his power his natural talents; built him a little museum and study, separate from, though attached by a passage to, the house, of which I had the charge during his absence from home.

"He was exceedingly fond of haranguing his brothers and sister in speeches of great length, about the merest trifles. For instance, one evening when I was sitting sewing at a swan's-down cape, he got upon the dining-room table, and made a most energetic speech upon the enormity and cruelty of taking the skin from the poor bird to make ourselves warm. He took me so much by surprise that I, being very young, was almost frightened at his vehemence, and felt exceedingly glad when he had concluded; therefore it made a lasting impression on my mind.

"One pet recreation of his, when sitting over a comfortable winter fire, about dusk in particular, before the lights were brought in, was to tear with his immensely long fingers (which he could do most characteristically and quickly) little paper figures of men, women, horses, etc., and place them upon the bars of the grate, pondering the while which would be the first destroyed by the small blazes that would arise from the gaseous coal. An army ready for battle was a favourite design, though I cannot say he had any warlike tendency, as he could scarcely be trusted with a pistol or a gun, being so awkward in the

handling of them. He was peculiarly fond of cats and other domestic animals. Even a lizard he once tamed and petted even to keeping it in his bed-room, when he visited his grandmother, who was much horrified at his choice, though, like most grandchildren, he was too highly thought of to be denied anything.

"Both when young and in more matured years, his habits were most simple and childlike. He delighted to play with young children, and scarcely ever passed a child in the road without noticing it. When about twelve years old he wrote sacred poems and paraphrases of the Bible, as well as lighter poetry, satirical verses, etc., and at school his friends used invariably to apply to him to write their valentines, etc. As a caricaturist he was well known in Edinburgh.

"His best painting, done when only thirteen years old, is in my possession."

In 1828, he went as day scholar to the Athole House Academy in Douglas, taught by Mr. J. H. Garvin, and reckoned at the time, and for many years after, the head school in the Isle of Man. "I can clearly call to mind," says Mr. Badnall, a scholar of somewhat later date, "the old school-room. It was a long and narrow upper room in a detached building, communicating with Mr. Garvin's house on the one side by a flight of steps, and with a good large play-ground on the other side by a wooden bridge. At the top end of the school was a large black desk, which was raised on a platform, and behind which, as the clock struck nine in the morning, Mr. Garvin was accustomed to take his seat, and there preside during the school hours."

"It was in this room that Edward Forbes was a school-boy. Mr. Garvin, although not a severe master, was held in awe by most of the boys, and his entering the school-room, and his walk up the room to his desk, will never be effaced from my memory as long as I live. His approach was the signal for universal order, and if his system of teaching was not, in other respects, the best, I must do him the justice to remark that order was a rule of the school, any serious infraction of which was visited by the pains of a long cane, administered often across the lower part of the back, from which I have seen many a poor fellow shrink in a pantomimic manner, and bodily disappear under the desk. I was then too young and too thoughtless to judge of any defect there might be in Mr. Garvin's system of teaching; but since, I have been satisfied that *in my case*, it lay in not being well grounded in my work. For instance, I was reading Virgil when I left Mr. Garvin's, in or about the year 1836, and my knowledge of the Latin grammar at the same time was so imperfect that I had to go the ground over again at my next school. It was the rapid building up of knowledge without sufficiently reckoning on the foundation, and compacting the structure, brick by brick, stage by stage, for future durability. I do not, of course, lay all the blame of this on Mr. Garvin. I believe that he was a man of high principle, and sincerely anxious for the progress of his boys, and that I was fond of shirking work too often, and slow at it when I did not shirk it. But, notwithstanding, I think that if the same system of teaching was applied to the mind of Edward Forbes as was within my experience,

I doubt very much whether it tended in an important degree to develop his intellect, or prepare it for the grasp of which it has since proved it was so eminently capable.

"I feel great difficulty in writing one word of seeming disparagement of my old master, Mr. Garvin; and what I have said is not without some misgivings how far the defect I have attributed to his teaching in my case, may not be, more than I know, chargeable on myself. I have said, however, what I think.

"I should add that Mr. Garvin had an under-master, who generally attended to the younger boys."

He attended this school till 1831, and this teacher, Mr. Garvin, now an aged man of seventy, thus describes the way in which his time was spent:—

"Edward Forbes was, I think, under my care for about four and a half years, during which time he read the usual short course in classics, science, etc., but was not what would be called a good scholar. That this was not from want of abilities, I need not tell you, but because his time and attention were devoted to other pursuits. His pencil was seldom or never out of his hand; his Latin, as other exercises, were curiosities; there never was a vacant space left on his paper, every corner filled up with a drawing of some creature or other, so much so, that he has got his knuckles rapped more than once for bringing me up exercises almost as difficult to decipher as the Rosetta Stone. . . .

"His school-books, if they could be got now, would be real curiosities, covered over as they are on the margins and all available places in the same manner as I

described his exercises to be. His conduct as a schoolboy was excellent. I have no recollection of having ever had to punish him for misconduct of any kind."

Finally, here is the judgment of a school-fellow, Mr. Fleetwood :—

"Edward was always a remarkably quiet, studious boy. Such a thing as a fight never entered his head, and he was never known to have quarrelled with any other boys. His temper was always extremely gentle and sweet, and at the same time he was so looked up to by the rest of the boys that he was always made umpire in their disputes. We all felt we should get strict justice from him. In all the years I knew him, I never can recollect his being punished in the smallest degree; he never did anything wrong. He was always at the head of the classical classes. Indeed, he was sometimes remonstrated with for giving too much assistance to the other boys in their Latin construing, which was always done entirely in Latin. He was never known to neglect his lessons; whatever they were, they were sure to be prepared; he would sit quietly down to them and master them. When asked, 'How is it you always are ready when we are not?' 'I just give my mind to it for half an hour, that is all,' was his answer. His health never was strong, and he never joined in any of the athletic exercises or rough play of the rest. The instant school was over he was off, never joining with the other boys, but quietly by himself, either looking after his insects or else going home. Though he had few intimates, his influence over all was unbounded; all looked up to him, and yet no one at the time ever spoke of his remarkable

talent in one way or another. His school-books were covered with caricatures and grotesque drawings. He would seize any peculiarity in a moment, and perhaps quickly open some book before the original, with, 'Did you ever see that before?' and exhibit an unmistakable likeness. His own appearance was very remarkable—very tall, intensely thin, and his long arms and legs appearing all disjointed; his hair very long, and always a habit of throwing it back by a jerk. When asked why he did not cut it, 'Oh, I could do nothing without my hair; it helps me to work.' He never could pass a stone without turning it over in search of anything underneath, and was always laughed at by the other boys for this habit. Mr. Garvin had *not* the right system for drawing out any talent amongst his pupils; but he was proud of Edward, who was considered quite the authority in the school on any classical point, both in Latin and Greek. He never showed any love for lecturing or haranguing at school, and I do not remember ever having heard of any such taste at home, though I knew the whole Forbes family well, and was a great deal at the house.

"His collection of insects was the first attempt; they were all beautifully arranged by himself. Coins he was very fond of; and he particularly excelled in making flies for fishing. He delighted in getting at the root of any difficulty, and would teach and explain to the other boys with immense patience. In the Latin construction he was never at fault, and would often astonish his master by the correct explanations he gave for different rules. He was never at any other school than Mr. Garvin's. He studied drawing with a Mr. Williamson, who took a small

class. Caricatures and grotesque figures were inherent in him from a very early age. He had a peculiar talent for seeing through the characters of all his school-fellows, but he was always so apart from them, and yet so gentle, that he never had an enemy. All felt he was different from themselves, but no one exactly knew how. We all felt his superiority, but no one thought of being jealous, he was so unlike the rest of us."

These independent accounts of Edward Forbes's youthful days are singularly unanimous in their references to the sweetness of his natural disposition, and his early display of unusual intellectual power. They imply also great diligence, manifested, however, in a most desultory fashion.

A further illustration of this is afforded by a paper in his handwriting, marked "A list of compositions *yet remaining,*" prefaced "I had written some poems, etc., before this year, but they were all lost." The list extends from 1825 to 1831, so that he began to rhyme before he was ten years old, and it chronicles eighty-five productions, the majority of which are poetical, and only three, and these the very last, scientific. A few of these papers are referred to as school-exercises, such as an "Essay on Governing the Passions;" "A Translation of part of the First Book of the Æneid;" "Homer's First Book in English Verse." Many of the verses are on religious subjects, and were probably written at his mother's suggestion, such as "Ebenezer, a Poem;" "The Descent of Nebuchadnezzar;" "The Prophecy of Huldah;" "David's Prayer and Thanksgiving;" "The Tempting of Abraham;" "Psalm xcix.;" "Psalm cxx." Like other young poets, he of

course wrote his tragedy. One, indeed, did not content him. In 1830 he registers, "*My first attempt in the dramatic line*—Sesostris, a Tragedy, Act I. and part of Act II.;" and immediately beneath it, "Junius Brutus, Act I. and part of Act II." Of Sesostris we hear no more, but in 1831, we read "Junius Brutus, Acts II. and III." Whether Act V. was ever reached does not appear.

The remaining poems are on the most diversified subjects, such as "'Ode to Mercy'—this was (1829), I believe, the first ode I tried;" "'The Falling Star'—one of my first trials (1830) at blank verse;" "'Whilst in Ida's Leafy Grove,' sent as a valentine, being the first (1830) I wrote, but one;" "'The Blue Bell,' this was written (1828) for Miss —— (now Mrs. ——), but never given; she desired it herself, and on writing two verses she asked for more, which produced these;" "'Tommy's Ghost, a Ballad,' a school satire; there was a second part, but it is lost;" "Remember me," a piece of real feeling, followed in the list (1830) by "Ode on Apple Dumpling." Many of the verses refer to Manx legends. There are several translations of Horace's Odes, a good many songs, some poems, probably complimentary, addressed to Azile and C. C., various acknowledged imitations of Scott, Byron, Southey, and Shelley, and not a few unfinished pieces. Of those poems only one school-exercise has reached me. Such titles as "The World of Affright," "The Spirit and the Flower, a Dream of the first World," "Amalek, his Sleep and the Wanderings of his Soul," make one wish that the productions so entitled had been preserved. I fear, however, that they were lost along with much else during his absence in the East in 1841-42,

when his father's household was broken up in consequence of pecuniary reverses, which placed all papers in his possession beyond his own control. The titles, however, and the number of verses in each poem remain on record, and as the verses must have amounted to many thousand lines, they constitute a notable proof of industry, although the list is not an exhaustive, but avowedly a most imperfect one. Two of the prose pieces on Manx superstitions, were published in the *Mirror*, of 1830 and 1832.

No reference, it will be observed, occurs up to the close of 1831 to Natural History papers, but the omission is designed. Under 1827, he writes, "In this year I wrote little, as I was occupied by Natural History chiefly. However, some pieces were lost, as the 'Ghost of Braddan;'" and under 1829, "This year's composing is all lost, save the two named, being occupied chiefly by Natural History."

Under a special heading as scientific, he winds up the list with three papers:—"Notice of experiments on the animals of the genus *Lymnea*;"[1] "On the formation of columnar basalt;" "On the Behemoth (unfinished);" but these properly belong to his student life at Edinburgh.

When by and by the question pressed for answer, what profession shall the young artist, poet, philosopher, follow? it was not easy to find a suitable reply. Had he answered according to the desire of his heart he would have said frankly that he did not wish to follow any profession. He had some bright day-dream of bound-

[1] Read before the Royal Physical Society of Edinburgh, 24th January 1832. This paper exists in his own handwriting in a place-book which he kept at College.—A. G.

less travel by land and sea with the pilgrim as he sailed from shore to shore, and traversed continent after continent, treading on shining minerals, plucking wondrous wild-flowers, watching the ways of strange living animals, and of stranger living men, painting the landscapes which rose Eden upon Eden before him, committing to song the deep thoughts and the gleeful impulses of his heart, gathering round him all the wonders of nature, and winning her secrets from her, till at some distant day he should return to his native land, laden with treasures and wisdom, and crowned with glory. Such, probably, was the nearest approach Edward Forbes had made to the conception of a worldly vocation. But he was not more remarkable for idealism than for common sense, and he kept his dream to himself. His friends, accordingly, were left to suggest a calling for him, and it might well puzzle them to say for which of the recognised professions his training had prepared him. Some twelve years of indulged valetudinarian boyhood, followed by some four of wayward attention to the business of a provincial day-school, could not furnish any remarkable amount of scholastic equipment. A little Latin, less Greek, still less algebra, mathematics, or even common arithmetic, and no physical science, no French, German, or other modern language at all, were the sum of formal learning which Edward Forbes carried away from school. From the sequel it will appear that he was also held to be a proficient in drawing, although it is only by incidental references we gather that one person taught him to draw, and another gave him some lessons in oil painting.

There is no room, notwithstanding, for blame, and

perhaps as little for regret. The youth himself was docile, eager for knowledge, and impatient of idleness. His father was liberal in furnishing the means of gratifying his son's tastes, even when he did not understand them. His mother watched with the tenderest care over her loved and gifted child. Mr. Garvin, a thoroughly conscientious man, did all in his power to make the young genius a scholar, and between teacher and pupil there existed from first to last a feeling of mutual respect and regard. None of those about him, however, could give him the help he needed. That his true vocation was Natural History struck no one, or that dredging, rock-surveying, and shell-collecting would become the business of his life. Nor was the want of special guidance in Natural History his greatest misfortune. It was still worse for him that his home-circle included no intelligent senior of his own sex who could have wisely trained him to habits of systematic study, and taught him by precept and example the importance of rule and method in intellectual as well as physical work. For want of such training much of his energy was unwisely directed, and he left behind him at his death a far less compact and conspicuous monument to his genius than his enormous diligence would have produced, had his intellect revolved in an orbit of smaller area, and been less liable to deflection towards new centres by attraction in every portion of its path.

If, however, we lament this for his sake as well as for our own, let us not forget that no scheme of discipline would have made Edward Forbes a methodical student. His sympathies were too many and too wide to make

it possible for him to concentrate his thoughts for any length of time on a few limited objects. He could not work unless his mind were free to roam backward and forward over a far wider field than he was professedly exploring. To abridge his freedom was to abolish, or at least greatly to narrow, his power of working, and had he fallen, in his early days, into the hands of formal pedants of the drill-sergeant school, they would have done him greater mischief by crushing his genial catholic spirit, than good by teaching him more orderly intellectual ways. The likelihood is that his temper would have been soured, and his playful fancy exasperated into biting satire. We may be thankful that he escaped this, and that when the chances were so many against his obtaining a suitable education, he should upon the whole have received one so peculiarly qualifying him for the duties of an open-air naturalist, which we now perceive was his predestined vocation.

All, therefore, that I will further say in reference to his early education is simply this. The minds of some men are like diving-bells with walls of opaque iron, and one small window at the top. Little light enters them, and that always in one direction. The minds of an exactly opposite class are crystal palaces, the walls all glass, and light entering in every direction. The choicest minds are intermediate in structure. They have windows to each point of the compass, besides a goodly skylight, but shaded corners abound under all degrees of illumination short of exposure to the direct glare, and there are shutters to close each window when that is desirable, and prevent the confusion of conflicting cross-lights. Edward

Forbes's intellect was of the second class, and open at every moment to all the skyey influences. It would have been better in some respects if he had been persuaded in early life to make it less than all window, by a shutter here and there, but he loved the full light, and all that he could be induced to do was to temper the brightness by a veil, originally but one degree less transparent than the glass, and, even when thickest, more translucent than opaque.

In this state of matters it was naturally of little importance in the youth's estimation which of many professions he nominally embraced. Apart from Natural History his chief acquirement was probably a large command over the literary resources of the English language. Although he certainly did not know its grammatical niceties, to which, indeed, he was indifferent to the end of his days, he had, for a boy of sixteen, read largely in its literature, and had largely employed it as an instrument of thought. He knew the riches of his mother-tongue, and felt conscious that he could employ them in the service of literature and science, but it was as a writer, and chiefly as a poet, that at that time he expected to render service. He was not naturally an orator, nor at any period of his life remarkable for fluency as a speaker. The style of even his earliest essays and poems is strikingly unrhetorical. The lectures which at a later period delighted all audiences, were, in the majority of cases, quiet monologues, equivalent to his share in a very earnest conversation with his audience. His more elaborate and eloquent prelections seemed rather thinking aloud, to relieve the mind of the thinker, than cunningly devised speeches,

intended to please, instruct, or convince the hearer. Hence, apart from those conscientious convictions which, we have seen, kept him from taking the priest's office for a little bread, the pulpit, I believe, had no attraction for him as an arena for oratorical display. The bar had still fewer attractions, for he took great interest in many questions of theology, but none, I imagine, in questions of law. His literary tastes and acquirements thus pointed specifically to no recognised calling, except, perhaps, that of play-actor, which may have had its secret charms for him, but would not have satisfied his ambition, and certainly had no attractions in the eyes of his friends. The office of lecturer on science, in which ultimately his genius found large scope for its utterance, was not then recognised, as it now is, as a profession which deserves, and will reward, the entire dedication of a lifetime to its studies and duties; nor were his qualifications for the office as yet known to himself or suspected by his admiring relatives.

A purely literary calling being thus debarred, there remained the two very dissimilar professions of physician and painter to choose between. To what extent the relative claims of Medicine and Art were formally discussed I do not know, but those of Art were held to be paramount. Had the choice lain between Natural History and Art, the former, there can be little question, would have been preferred, though in fact, as Edward Forbes had resolved to be both naturalist and artist, it mattered comparatively little which of the titles he bore as his professional one. To his friends, who entertained greatly exaggerated ideas of his skill as an artist, and could much better appreciate

his drawings than his geological or botanical speculations, the honourable and lucrative vocation of a great painter seemed in all respects preferable to the ill-rewarded and dubious profession of a naturalist. As for medicine it had no interest for him, except as including certain departments of Natural History, and for its own more special studies he had an unconquerable aversion. No wonder, then, that disliking medicine, loving Art, and hoping for sufficient leisure to follow science and literature also, he should have listened with delight to the commendations bestowed on his youthful drawings, and consented to make Art his profession. Without any misgivings he set off for London, lightly laden with sketches which were to prove to the world his genius as an artist, and found, as so many an eager youth had done before, that he had mistaken his vocation, and that London had neither room nor recognition for him.

CHAPTER III.

FALSE START AS AN ARTIST—FIRST RESIDENCE IN LONDON.

EDWARD FORBES paid his first visit to the metropolis on June 21st, 1831, and remained there till 18th October of the same year. His previous biographers have described his artistic pilgrimage to London as if it had fulfilled all the expectations with which it was undertaken. In reality, however, it fulfilled none of them. The sum of its experiences may be stated in two sentences. Edward offered himself for admission as a student of the Royal Academy, but the specimens of his handiwork, which, according to custom, he showed, were not thought satisfactory, and he was refused. He then placed himself under the tuition of Mr. Sass, a well-known London artist, who has numbered among his pupils many of our distinguished painters. Mr. Sass, however, held out so little encouragement to young Forbes to make painting his profession, that he soon abandoned all thought of formally prosecuting it, and after a residence of some four months in London, returned for a few days to the Isle of Man, and then proceeded to Edinburgh, where he began the study of

medicine in November 1831. These particulars I have learned from his sister, Mrs. Attwood; from Mr. Garvin, who accompanied him to London; and from a journal of his own. Mrs. Attwood, in answer to queries on this point, says, "The only lessons in oil-painting which Edward received in the Isle of Man were from a deaf and dumb gentleman, named Robert Kerr, of Edinburgh, brother of Lady G—, who, if I remember rightly, gave lessons without the knowledge of his family. The best picture Edward painted in oil I have now (1857) with me in California. It is a copy from one of the Italian masters, representing 'The Lord of the Vineyard with the labourer returning the penny, and the clerk waiting, pen in hand, to enter the result in the account-book before him.' It is one of the few which he took pains to finish, and the expression of each face is admirable. When he went up to London in 1831, he took with him an original painting of his own to exhibit; but, although the design was considered good, it wanted *finish*, and was in consequence rejected. After studying for a time with Mr. Sass, he found the hard work it required to become eminent, and his great passion being for Natural History, he abandoned painting as a profession. Although disappointed, I think he did not regret this step. His studying medicine at Edinburgh was by our father's request, that he might have a profession to fall back upon in case of necessity."

Mr. Garvin has very kindly given me all the particulars he could recall of incidents which happened twenty-six years before. He does not conceal that from the first he strongly disapproved of the London journey, nor does he

profess to be a judge of art. However, I think it best to leave the reader to decide for himself what deduction must be made from Mr. Garvin's conclusions on the score of bias or disqualification. He is the only witness who can be called, in reference to the period before us. In reply to a question concerning his pupil's instruction in art, he states that, in the estimate of his relatives, "he was nothing else than a Reynolds or a Hogarth in embryo, and instead of allowing the boy to receive an education which would really have been of use to him, he was put under the tuition of a deaf and dumb man in the island to do *oil-painting*. A picture of the Virgin and Child was executed in oil. It was a *prodigy of talent*, and decided his parents at once to send the lad to London to study under some eminent artist. As I was going there, I was requested to take Edward with me, and make the necessary arrangements. On inquiry after our arrival, I found that Mr. Sass would be the best person I could select, and on him we called. Before our visit was half over, I could see that poor Edward's confidence and high opinion of his merits were very considerably shaken. He had brought some specimens of his drawings with him. Some of these Mr. Sass tossed with a *humph*, others with praise which I think Edward would rather have seen the papers thrown in the fire than have heard. At all events it was plain that Mr. Sass thought a better profession might have been chosen, and so I believe Edward began to think himself. I gave a fair statement of all this to Mr. and Mrs. Forbes, and strongly advised that the lad might be allowed to return, devote the interim to his Greek and Latin, and go to Edinburgh

in October. I think, after all that had passed, shame prevented them from agreeing to this, and so I left Edward behind me. He went to Edinburgh in October. I do not think that he ever turned his mind seriously to medicine. Natural History was in short his main pursuit."

In another letter, Mr. Garvin says, "I do not think that Sass entertained any very high opinion of Edward Forbes's artistic talents. Consequently he scarcely liked to encourage him to make Art his profession. *I know* [the italics are Mr. Garvin's] *he told him it would take a long time to get rid of the bad habits he had acquired.* When I parted with Edward he was much discouraged, and but for shame would have been glad to return with me." Mr. Garvin further refers to there having been "a good deal of soreness and disappointment, and no little mortification, that hopes and expectations were not realized," but that Edward was quite reconciled to the abandonment of Art as a profession.

The fruitless issue of the art-journey to London can excite no surprise. No one familiar with Edward Forbes's later sketches will doubt that he had in him some of the highest elements of a great painter, and would have become one had he devoted himself to Art with a single eye to success in it. But after deducting the time spent in school, and in preparing for it, the constant employment of his pen on songs, paraphrases, valentines, tragedies, and what not, and the very large portion of his leisure occupied in the pursuits of Natural History, there remains but an insignificant residue to allot to Art. That residue, moreover, was spent or misspent under the

guidance of a provincial drawing-master unknown to fame, and of a deaf and dumb amateur painter whose infirmity must have seriously lessened his usefulness as a teacher. Add to this, that when out of sight of these preceptors the boy was permitted to follow any style of drawing that he fancied, and to perpetuate every mannerism and evil habit which he had caught from bad models or had unconsciously acquired; and who shall wonder that the great London master, to whom style and execution were everything, and fancy and inventiveness nothing, frowned and shook his head, and, with many a "humph," tossed the lad's sketches aside and told him that he knew not whether he had most to learn or to unlearn. It was not to be expected, however, that he should follow Mr. Garvin's advice, and seek a cure for his disappointment in immediately retracing his steps to the Douglas Academy, and sitting down to the study of Homer and Virgil. A summer in London must have had immense prospective charms for Edward Forbes. Nominally he continued to prosecute drawing under Mr. Sass, and unquestionably he profited not a little by his instructions; but there can be no doubt that he had made up his mind to join the University of Edinburgh at the beginning of its next winter session, and was only concerned about spending agreeably the interval till the academical year commenced.

How he spent his time in London he has sketched, but only in bald and colourless outline, in a journal which he kept during his residence there.[1] It is a small

[1] For a knowledge of the existence of this journal I am indebted to my friend, Dr. John Percy, Professor of Metallurgy in the School of Mines, and for the loan of it to J. S. Bowerbank, the naturalist. The latter picked it up at a book-stall

unruled octavo, like a pass-book, with its author's name, his coat of arms, and the shield of the Isle of Man, on the first page. The earlier leaves are devoted to the journal, the later ones to a cash account, a curiosity in book-keeping. Several pages are occupied with confused money calculations, and still more with pencil sketches, chiefly portraits, among which those of Lord Brougham and Dr. Knox are conspicuous. Its statements are exceedingly brief, some in ink, many in pencil, all of them very scrawly, and often with difficulty legible, as if the entries had been the last work of the evening, and executed just as the writer was dropping asleep. In another and characteristic respect the journal is curious. The part devoted to London gives neither year nor month, and in most cases only the number of the day in the month, or instead of this the initial of the day of the week. Occasionally both figure and initial are given; but they cannot be trusted, for one of the months (August) has originally been represented with thirty-three days, and after a hesitating correction is left with thirty-two. This careless handling of figures we shall afterwards find was a significant peculiarity of the writer, fostered, no doubt, by imperfect schooling in arithmetic. As occurring in the journal it made its chronology for a time undecipherable; but on the day of leaving London he at last gave a month, viz., "October, T. 18," and by reckoning backwards from this as Tuesday the 18th, after amending the calendar by

in London, though how it found its way there is not known. It was not left behind him by its author in 1831, for it records his journey to the Isle of Man, and thence to Edinburgh, and several particulars of his residence there from November of that year to the close of the summer session, 1832.

changing the 32d and 33d days of August to 1st and 2d September, we find the journal to commence on "S. 18," Saturday the 18th June, when he left the Isle of Man, reaching London on the 21st. The year is still to identify; but by a reference to the king and queen (William IV. and Adelaide), and to the coronation procession which he witnessed, T. 6 (Tuesday [?] September 16th), it must have been 1831. Some extracts from the journal will illustrate its character. Here is the second entry, one of quite unusual length, describing the journey from Liverpool to London:—

"*S.* 19.—Breakfast. Bill, 14s.; started by Bang up at eight; met Mr. C——; fine houses, but no *strand;* railroad; a steam-coach and train passed; surprising, wonderful; a passenger with air-cushion; good companions; Prescot; Warrington; high cultivation, and flat but fertile country; bought a veal-pie; new road to aqueducts often destroyed by frost and thaw; plenty of wood; all sandstone; roses, generally blush; curious cottages; Knutsford; very few parish churches; a populous country; churches generally fine; country more hilly; Staffordshire; magnificent view; potteries; Newcastle [under Lyne]; military to keep down the colliers; women and girls generally good-looking, being often pretty, not handsome owing to awry (?) noses; dinner not fit to eat; starved; got a biscuit, and wine and water; country still very fine; population increasing; country magnificent, like one great park; Stone; Marquis of Stafford's beautiful; Stafford; fine town; Hall and Hospital; good houses; fine town altogether; Penkridge; small town; Wolverhampton; now for smoke, coal, and iron; no

more trees or fields, but coal and iron pits; railways; coke; fire; colliers; fine houses; blazing chimneys; beautiful churches; steam-engines; Pandemonium (upper surface); underminings. Houses in thousands; people in millions, and in the midst of smoke; no country more populous; groups of colliers, very picturesque, taking a 'treat for the hozes;' some of them killed every day by pits falling in; not paid, but goods instead. Saw some gipsies under a hedge; country got right again; fields, etc.; fine entrance to Birmingham; seemingly very fond of show there; stopped at the Castle Inn; two members at tea; hungry enough; eat heartily; took a walk; lost my way, but found it again (Pr. G.); fine buildings; very grand shops, etc.; even find that the churches, Royal Institution? Royal Hotel, a magnificent room; hotels generally fine; found my way back; well pleased with the town; Birmingham a very fine place altogether, and indeed beautiful; plenty of people; good old inn."

The first day in London is thus described:—

"Slept well all night; breakfasted; waited for Mr. Garvin till twelve o'clock; went with Mr. Grieve past St. Paul's to Blackfriars' Bridge; beautiful view; St. Paul's there looks its proper size, towering above the churches around it; Somerset House looked very grand along the river; went to see the R. Acad. Exhib.; the Hercules Farnese immensely large; the pictures very showy at first, but not so many fine ones as I expected; Etty—Maid of Judith one of the best histories; landscapes in general superior to histories; Hilton a very good painter."

I shall now extract, under their dates, which I fill up in full, the reference to his Art studies:—

June 22, 1831.—Among other brief entries occurs "Picture safe." This, I presume, refers to the painting in oil which he brought with him as a specimen of his work.

"*June* 23, 1831.—Went to the Academy about entry; rejected; bought" [the remainder, consisting of three or four words, is illegible]. This is the only allusion to his rejection contained in the Journal, and it appears from it that he offered himself for admission as a student of the Royal Academy before seeing Mr. Sass, who would probably, if consulted, have dissuaded him from the step. The rest of June is spent in sight-seeing.

"*July* 2.—Mr. Sass's gallery. . . . Write home. Mr. Sass's terms cheap." Then comes another interval of sight-seeing whilst waiting instructions from home. Letters travel slowly in those days, and nearly three weeks are gone before, as should seem, directions for his further proceedings in London arrive from the Isle of Man. At length we find—

"*July* 23.—Mr. Sass; his studio; casts; drawing-paper, etc."

"*July* 25.—Drawing mat.; port-crayon; Mr. Sass's, first time; his principles; his pupils, etc."

"*July* 26.—Mr. Sass's, second time."

"*July* 27.—Mr. S., an ice, raspberry—not wholesome."

"*July* 28.—Mr. S.; walk."

"*July* 29.—Mr. S.; walk."

"*October* 8.—Mr. S.; Reform Bill thrown out."

Similar entries occur against nearly every week-day down to October 15th, so that he must have daily attended this teacher with great regularity for about three months; but all the references are provokingly concise, and throw no light on his progress as an artist. The fullest allusions to his artist work are the following:—

"*September, Friday.*[1]—Mr. S.; went to Rowney and Forster's for millboard, etc., cheap; and oil to begin pictures."

"*September* 5.—Mr. S.; wet mor.'; painted the first coat of my Tribute Money."

"*September* 15.—Mr. S.; home; painted."

In addition, he notes in the briefest terms visits to the National Gallery and other collections of paintings, but there is nothing to quote from these references. In truth, no one limited to the journal as his only source of information, would discover from it that its writer was an artist by profession. His fullest descriptions are of theatres, churches, and spectacles; and the most explicit personal references are to literary productions. All the sights of London are welcome to him. He climbs the Monument, threads the Thames Tunnel, listens in the whispering gallery of St. Paul's, is hoisted up at the Coliseum, fleeced (not without protest) at the Tower, makes the acquaintance of the beasts in the Zoological Gardens, walks in the parks, takes off his hat to the King

[1] This was apparently the first Friday in September. In the Journal it is very illegibly marked 2 F. By the reckoning of the book, however, it should be 3d, for two days before it comes the 32d (!) day of August, and immediately before it the 33d, afterwards hesitatingly changed into 1st (of September). Between, however, the last Sunday in August and the first in September seven days intervene, although the Journal is professedly kept from day to day. This fact is noticed not for its chronological but its psychological interest.

and Queen; salutes "The Duke;" steps into the Court of Chancery and sketches Lord-Chancellor Brougham; attends a sitting of the Lords and Commons; witnesses a review in Hyde Park and a launch at Woolwich; eats whitebait at Greenwich; promenades in Kensington Gardens; and assists at the Coronation procession.

There is willing payment, also, to see the "Industrious Fleas;" "Animalculæ" through the microscope; "a whale," of which we read—"sat in its belly;" "Mazeppa's Horses," and the "Battle of Waterloo," at Astley's, where he admires the "fine grouping;" besides endless walks through the streets of wondrous London, and endless losings and re-findings of his way. He makes the round of the chief theatres—Drury Lane, Covent Garden, the Haymarket, the Olympic—and sees Fanny Kemble and her father, Liston, Farren, and other famous actors and actresses. To one so fond of poetry, painting, music, sculpture, and so keenly alive to all the manifestations of wit and humour, dramatic representations were a source of peculiar pleasure all his life, but he records his visits to the theatre in the baldest terms, such as, "*Haymarket Theatre. New Comedy. Mr. Farren, Mr. Harley, etc.*"

He was very diligent in attendance on church, going generally twice each Sunday, and to a different church or chapel on each occasion. In these attendances he had an eye to the architecture and the altar-piece, as well as an ear for the service. Here are some of his entries:—

"*June* 26, *Sunday.*—Went to a church near;[1] a

[1] I do not know in what part of London he resided at this time, but, from various allusions, his lodgings appear to have been in the east end of the City, at no very great distance from the Tower or the Monument.

poor one. Evening, to Foundling chapel. West's painting of Little Children and Christ. Fine singing."

"*July* 8, *S.*—Stayed at home. Went to St. Paul's, but too late for service."

"*July* 17, *S.*—St. Stephen's, Walbrook; beautiful church. St. Bride's; West's pic. of the Mart. of St. Stephen."

"*August* 21, *Sunday.*—Went to parish church. Evening, went to Female Orphan Asylum; preaching good."

"*Sep.* 17, *S.*—Went to St. Bennet's. Evening, to St. Mary's, Walworth; a curious church. Dr. Birch, rector. Not a good lecture. Communion table."

"*Sep.* 25, *S.* . . . Evening. Mr. Clayton at Poultry Chapel; his preaching flowery but fine."

"*October* 9, *S.*—Parish c. Evening, to St. Sepulchre's, but Mr. Dale did not preach."

From the extracts already made from the journal, it will be sufficiently apparent that young Forbes did not brood over his disappointment at the Royal Academy, or lose heart at Mr. Sass's criticisms. On the other hand, he falls diligently to work in his characteristic multifarious way, and turns his residence in London to the best account. That the reader may judge for himself how he divided his time, I subjoin a continuous extract from his diary, amounting to nearly one page.

In reading, however, what follows, as well as other portions of the journal, it must not be forgotten that it is designedly a meagre almanac or day-book, kept in a spirit of the utmost *réticence*. What it does tell is of positive value, but no conclusion can be drawn from its

silence. The rejection of the Royal Academy and the adverse criticisms of Mr. Sass, he certainly felt keenly, but he does not betray his disappointment by a single word. His love of fun and frolic, and his delight in society, must have found gratification in London as well as elsewhere, but he only hints at this, and the general, though certainly false impression conveyed by the journal, in reference to its author, is that of an almost friendless, solitary student. The names of several acquaintances are given, and we may infer that "Arthur Rigg" and "Bob Gun" were young men. Occasional dinings out and tea-drinkings are recorded; and on one occasion, "at night a dance at Mrs. Grellier's;" but all is told in the driest fashion, and no one would infer from these entries that the journalist was one who, wherever he went, attracted a host of lovers and admirers around him, as infallibly as a candle attracts moths :—

"9.—Mr. S.; Cullen's Nosology; blank book and paper; 160 lines in Virgil."

"10.—Mr. S.; Virgil."

"11.—Mr. S.; bought a Homer for 8s.; Mrs. Grieve's; Mr. A. G. Kirby's Entomology; apparatus; Malcolm on Cow."

"12.—Mr. S.; walked; went to see Carpenter's microcosm; living kaleides; some optical illusions; animalculæ; bought the prints of Comic Annual; 50 lines Homer."

"13.—Mr. S.; bought a *Mirror*; received a letter."

"14.—Went to church. In the evening to Mr Fletcher's chapel; handsome out, not so in; fine pulpit not preach."

"15.—Mr. S.; Ingpen's Instructions in Entomology for 1s. 6d.; did nothing."

"16.—Mr. S.; stayed in house; took a walk in Cheapside in the evening."

"17.—Mr. S.; went to Millwall; plants, insects, stones; Isle of Dogs; thunderstorm; coached home."

"18.—Mr. S.; housed it."

Cullen's Nosology, it appears from another entry, cost a shilling, and I am afraid was dear at the price, for it was probably never read. Its purchase, however, is significant, as showing that Edward Forbes was early in July looking forward to exchanging Art for Medicine as a profession. Homer and Virgil had likewise a prospective professional value for him, as keeping up his knowledge of Greek and Latin; but their literary interest was probably still greater. It was to Literature, indeed, next to Art, that he devoted most of his time in London. Natural History, as he then especially loved to study it, among its living objects, in the open air, could not be prosecuted in the Great City, so, when tired of handling the pencil, he took up the pen and became a *littérateur*. The most impassioned entry in the journal is the following, under August 20th:—"Mr. S.; my first writing in print in the *Mirror*, but rather blundered by printer; walked all Oxford Street; west part not so fine as east. Hyde Park; home by Strand; sent another to Limbird [the publisher of the *Mirror*], '*El ultimo suspiro del Moro*;' wrote out *The Tulip* also for him; bought a new hat for twelve shillings; what's a Pic-Nic?"

Whether the new hat was bought on the strength of the expected income which his writings should bring

him, or simply to celebrate his admission into the goodly guild of writers of books, or with an eye to the mysterious PIC-NIC which so suddenly appears above the horizon, the taciturn journal does not decide. But that he was, if not elated, at least comforted by the reflection of his literary genius from the pages of the long dimmed and forgotten *Mirror*, appears from an entry five days later :—

"*September* 25.—Mr. S. ; put three communications in post ; one to *Mirror*, one to the *Metropolitan*, and one to the *Englishman's* [*Magazine*] ; wrote out 'The Ode on Painting.'"

From the list of compositions referred to in last chapter, it appears that the first writing was "Paper on Manx Superstitions," in *Mirror*, No. 504, for August 1831, "The Tulip," and "The Last Sigh of the Moors (*El ultimo suspiro del Moro*)," "Ballad wrote in imit. of Southey," are marked in ink as "sent to Limbird for *Mirror*," but they were not, it should seem, inserted, for the statement is scored through. From the same list, it appears that another of his poetical effusions called "The Moss Rose," was written in imitation of Shelley's "Sensitive Plant," and sent to the *Englishman's Magazine*, which however failed, so that the verses never were printed. I do not know what the communication addressed to the *Metropolitan* was. So the Journal proceeds with tantalizing brevity, till, under October 10th, we read—"Mr. S. received a letter with home orders." On the 17th, the only words legible in the brief entry are, "Packing up ;" and the next page of the Journal is headed "Journey from London." Edward Forbes left London on the 18th

October 1831. When he returned to it as a residence, eleven years later, it was to occupy one of its places of honour, and to rise from this, year by year, to higher distinction, till, when he left the metropolis in 1854, the eyes of the whole nation were upon him, and its chief cities battled which should count him among its living glories.

CHAPTER IV.

ACADEMIC STUDENT LIFE IN EDINBURGH.

FROM London Edward Forbes returned to the Isle of Man, and remained there till the close of the month, making preparations for commencing the study of medicine in Edinburgh during the approaching winter session. On 31st October he left Douglas, and, sailing by steamer from Ramsey Bay to Glasgow, reached Edinburgh on November 3d, 1831, where, without delay, he matriculated in the University, and began the study of anatomy and chemistry.

Several of his biographers have dated his arrival in Edinburgh a year later, but this is a mistake which it seems well to correct at the outset. The Journal, so fully referred to in the last chapter, is sufficient to decide the matter. Two pages are occupied with the "JOURNEY FROM LONDON," extending over three days, and concluding on October 20th, with "The sea once more; the island in sight; home; ALL RIGHT; END OF LONDON TOUR."

The next page is entitled "JOURNEY TO EDINBURGH," and begins—"On Monday, 31st October, left Douglas in the gig, and got to Ramsey at seven at night." "On

Thursday, 3d November, we read—"Breakfast at Glasgow; booked outside; middle road to Edinburgh; tremendous show; Edinburgh." Next day was plainly spent in making calls, and taking a stroll through the strange city. Among other entries occur—"Friday.—Dr. Farquharson; Arthur Seat; Salisbury Crags; High Street; New Town." There is no entry against the Saturday or Sunday. The last entry runs—"Monday.—University; Dr. Knox, etc." It was thus on the first Monday of November 1831, that Edward Forbes commenced his studies in Edinburgh. He entered the University of Edinburgh as a student in 1831, and returned to it as a Professor in 1854. My own connexion with the University extended over nearly the same period, and in looking back across the quarter century that separated the student from the Professor, I have been startled by the number and magnitude of the changes which together we witnessed.

In 1831, the Reform Bill was still a Great Perhaps, and men were mad with hopes and fears as to what the end would be. The first ripple had scarcely stirred the waters of ecclesiastical strife. Religious Oxford had not begun to exchange glances with Rome, or the Church of England to quicken with the abounding life which now runs in her veins. The *perfervidum ingenium* of the Scottish Presbyterians seemed needlessly wasting itself on a small question affecting the mode of inducting a minister, and was itself unconscious that it was about to convulse the country, and rend asunder the Church of Scotland. Ireland seemed to have passed into a state of chronic rebellion beyond hope, or help, or cure, for gene-

rations to come. The cholera had just planted its black flag on our shores, and the most stout-hearted quailed before the new lieutenant of death; but no one perceived that the black flag had a silver lining, that the dreaded pestilence was a just and merciful avenger, or that the statistics of its slaughter were the necessary preamble of those sanitary enactments which are saving more lives than it took away. It has had to smite once again; to summon in its train the potato disease, the Irish famine, the Irish fever, and to bid them do their worst before men would perceive that it bore the sword of God, or that its visits were judicial, and its chastisements in mercy. But as yet all this was in the future.

The map of Great Britain was meted out by mail-coach chronometer, and the Postmaster-General's time-bill was an immensely vaster region than it is now. It took Edward Forbes three days to reach the Isle of Man from London, and three more to reach Edinburgh from the Isle of Man. There was but one public railway in England, and none in Scotland or Ireland; and even the Duke of Wellington, appalled by the death of Huskisson, shrank for years from the risk of a similar fate. No steamship had crossed the Atlantic, or gone forth on a long voyage into the open ocean, and according to supposed authorities, none ever would. Screw-propellers were still unheard of. Iron ships were rare novelties; and old sailors were still laughing at the notion of war steamers.

The Penny Postage was not yet an idea, even to the imagination of Rowland Hill. The Electric Telegraph, which might have been in 1800, and which had been

seen to be a possibility since 1820, was still no more than one, and seven years were to pass before England received at the hands of Wheatstone her first electric wires. Photography had revealed glimpses of its wonders to the second Wedgwood, and had sought the fostering care of the great Davy, but even he could not prevent its being swallowed up in darkness, and the amazing future of that art was hidden from every human eye.

It might seem at first sight as if those changes were too general to deserve recognition in discussing the life of an individual. But let any one who has lived through the interval between 1830 and 1850 consider the difference to him, whatever his special experiences may have been, between no Reform Bill, no Tractarian movement in England, no Free Church in Scotland, no rebellion in Ireland, no Irish famine or emigration, no railroad, no ocean steamer, no penny postage, no telegraph, and all these made affirmative, and he will look on a reference to none of them as superfluous.

But besides those revolutions in the wide social and moral atmosphere which envelopes the whole country, there were others not less striking in the narrower, but still wide, atmosphere within which Edward Forbes specially laboured. Great and famous as Edinburgh then was as a school of Medicine and of the Natural Sciences, and shining forth, as it did, as one of the lights of the world, it was entering on a new phasis as the seat of a University, at the period under notice. The chief features of this change were the immense strides which the Physical Sciences were taking, and the altered and

greatly increased practical character of the modes of teaching them which these strides necessitated. I do not mean to imply by what has been said that Physics alone were progressing, and that Art, Literature, Theology, and Philosophy were lagging behind. On the other hand, Logic and Metaphysics, as taught by the illustrious Sir William Hamilton, were about to invest Edinburgh with a new lustre as a school of Philosophy; and the name of John Wilson was still a mighty spell to attract strangers to the Moral Philosophy classroom. But these chairs, and still more those of Classics and Theology, had little influence over the subject of this Memoir, and therefore I pass them by.

In speaking of the Natural Sciences more fully, I will not deny that we easily deceive ourselves as to the greatness and importance of the changes which happen in our own experience. Every year is, in many senses, an *annus mirabilis:* for some things the long-expected harvest; for others the hopeful seed-sowing; for others the midway bursting of the flower-bud, with the spring behind and the uncertain autumn yet to come. In the perspective of the whole world's progress, the doings of twenty-five years diminish into a point so microscopic, that the historian does not dip his pen twice in recording them all. But twenty-five years, especially when counted from the close of boyhood, are a long period in the longest human life, and a large part of a century. For us, accordingly, of this generation, the years between 1831 and 1855 must bulk large, even if it were not the case, as it certainly is, that they form a quarter century remarkable for the rapidity and completeness of the

change which it saw impressed upon all the physical sciences.

The chief science on which Medicine rests, Anatomy, was still paralysed in its progress by the legal restrictions which connected its study with the punishment or the commission of crime. The hangman was the only official from whose hands a dead human body could be lawfully procured, and the more thoughtless among the students anticipated a public execution with a certain grim satisfaction and professional interest, which we may be glad none need entertain at the present day. The atrocities of Burke and Hare had spread terror and indignation throughout the country, and, although in reality their crimes had saved the graves of the dead from desecration, a natural reaction of feeling led the entire community to watch their churchyards with redoubled jealousy, and to show no pity to the mercenary resurrectionists or adventurous surgeons whom they surprised at their ghoulish work.

One of my earliest remembrances of this period, is of a fellow-student lying under charge of the police in a surgical ward of the Infirmary,[1] with a gunshot wound received in a resurrectionary expedition to Musselburgh churchyard. He was looked upon as a martyr by the students, and as little better than a murderer by the people. The law dealt mildly with such transgressors, and, till roused by the hideous murders in Edinburgh, was, in regard to resurrectionism generally, Justice without the scales, and with a very thick bandage over her

[1] This was before the occupation of the present Surgical Hospital, which was then in course of arrangement.

eyes. There was no doubt a *Habeas Corpus* Act for such cases, but the afflicted relatives who put it in operation to recover the bodies of those of whom the grave had been robbed, might have pronounced it, in bitter irony, a dead letter.

The janitors of the anatomical rooms detected a law officer through the most cunning disguises, and had always extreme difficulty in understanding his errand when he produced a warrant to search for a body missed from its grave. If at length he was admitted, it was not till the *corpus delicti* had vanished through a hole in the wall, or had otherwise disappeared, and with looks of innocence or indignation every one disclaimed all knowledge of the matter. It was rumoured, indeed, that on such occasions the detective's purse was heavier when he left than when he entered, but could that have any connexion with his reporting that his mission had failed? The memory of these things is fast passing away, but it is only recently that a lecture-room was taken down in Surgeon Square, Edinburgh, provided with a sliding pannel through which *subjects* were hoisted into a dark garret whenever the approach of a sheriff's officer was signalled from the gate.[1] Edward Forbes's first scientific lectures were delivered in this room.

Things had reached a crisis at this period. The repetition in London of murders to supply the dissecting-rooms with "subjects," at length roused the Legislature to the necessity of a total change in the law, but it was not

1 This fact was communicated to me by my friend Professor Allen Thomson, who added that when he entered on the duties of the Chair of Anatomy in the University of Glasgow, he found the anatomical rooms furnished with a similar arrangement.

till 1832 that this change was effected. The University Societies were still discussing in formal debate the rights of a dead man's body.

It fell to my own lot about this time, as the solitary medical student in the University Diagnostic Society, to defend the Anatomy Bill at one of its meetings; but I cannot remember whether the *Ayes* or *Noes* had it. Nor was it matter of half so much concern to the combatants which side was victorious by number, as which was most skilful in fence. He would have been counted a very unworthy member who could not, on due notice, take either side on this or any other topic; and it must not be held as implying indifference to truth, that to make a good speech was considered much more important than to win a verdict. The debates were gymnastic exercises. The members were training themselves for the bar, the pulpit, or the academic chair, if haply they might reach one or other of these high places, and could not always be discussing "Was Charles I. a Martyr?" A novel topic was welcome to all classes of students, and it was discussed by them in a novel fashion. Eloquent embryo advocates were not wanting on the one side to affirm that as doctors were the chief gainers by the progress of anatomy, their bodies should be the first if not the only ones to be sent to the dissecting-rooms. On the other side, indignant half-fledged doctors hasten to reply, that as lawyers were the chief gainers by the existence of laws, they should be compelled to enlist as soldiers or sailors in times of civil rebellion and threatened foreign invasion, and should first of all men give their living bodies to defend the

realm. Much grave nonsense, intentional as well as unintentional, was talked on both sides. There was endless punning on the difference between His Majesty's subjects and the doctor's subjects, and serio-comic discussions on such physico-metaphysical problems as "Can a given entity be at the same time a *subject* and an *object?*" No one, I suppose, made more puns on the matter than Edward Forbes. Some time after Mr. Warburton's Anatomy Bill had come into operation, and whilst it was exciting great disappointment by its imperfect working, he assisted in rousing his fellow-students to petition for its improvement by the following characteristic doggrel :—

THE ANATOMY BILL.

O come, ye grieving medicals, and listen to my lay,
Warburton's Bill the subject is, a bad one, too, you'll say ;
But what else can I sing about, since in the rooms around,
Than that curs'd bill, no other *subject* happens to be found!

O measureless the evils are, that measure hath brought on:
Anatomy is cut up quite, and surgery is done!
The demonstrators, too, are now all at their wits' end set:
And though they're at *extremities*, not one limb can they get.

Should one by chance a thorax get, one's *parted* from the *part*
By that *disheartening* bill ere yet one can cut up the heart;
Our bones are *boned* and buried too, ere *bonus* we may gain,
And to examine arteries, we try it all in *vain*.

The lecturers deserted are, amid their empty rooms,
And *grave* as dead men lying fast enshrouded in their tombs!
No resurrectionist dare take his digger in his paws,
Lest that curs'd bill should hook him with its prohibition clause.

The bill which burking should prevent has burked anatomy!
The bill for keeping murder down has murdered surgery!
The operation's *capital*, as some old fools have said,
Since operations of all sorts it knock'd hath on the *head!*

O *Billy, Billy* Warburton! what have you been about?
More subjects far had been brought in, had your bill been thrown out;
And if with better *measure* you don't furnish us, I ween,
Soon in the schools, as well as rooms, no *body* will be seen!

> Then rouse ye, suffering medicals, your sentiments declare;
> The *dead* weight of Warburton's Bill no longer calmly bear;
> Petition! meet! and speechify! seize all sorts of occasions
> To demonstrate how much you stand in need of *demonstrations*

Such jestings may seem to some inconvenient, but in truth they were a sign that the worst was over. So long as Resurrectionism was a perilous reality, no debating society discussed it, and no one made jests upon it. When, moreover, it led to murder,—and for a season a large section of the public looked on every surgeon and physician as indebted for his skill in saving life to previous treacherous success in taking it away,—a cry of horror and indignation went round the land, and every voice was raised in deprecation or reprehension. By and by, however, when the only criminals were found to be one or two of the basest of mankind, and a cure for the immediate evil—which, moreover, could not but signally advance the progress of medicine—was seen to be within easy reach, the public became ashamed of the inordinate terror it had betrayed, and fell to mocking and making light of the spectre before which it had so recently been dumb. It was quite safe to laugh at it now that it had decayed and waxed old, and was ready to vanish away. But we must not forget that without the terror we should never have had the laughter, and that the introduction into the English language of the verb "to burk," which, in spite of its vile associations, has met with so wide an acceptance, was the prelude to the introduction of the Anatomy Bill, which has done so much in Great Britain for the science of physical life, and for the art of healing.

The bill for a while worked badly. Edward Forbes

studied the structure of the human frame under disadvantages unknown to students of the present day. In 1831, and even considerably later, the medical student was driven to expedients which made the progress of anatomy very slow. A legacy of his incorporeal bones was one of the choicest gifts which the 'passed' surgeon or physician could confer upon the under-graduate, still contemplating with alarm the terrors of the Examination Hall and the realities of practice. Churchyard relics, brown as the soil to which they were fast returning, and such as no student would now finger, were carefully preserved and diligently handled. An entire human skull was in possession of very few; a complete set of dead bones was in possession of none, and inaccessible generally to all. Many were indebted to casts or engravings for nearly all that they knew of the structure of the body.

The practice also of consigning the bodies of executed criminals to the anatomists, which at one time had been a decided boon to medical science, had latterly become the opposite, by investing all *post-mortem* examinations with an air of ignominy. This was especially the case with the humbler classes, whose vague dread of dissection was sharpened into precision by the vulgar broadsides sold through the streets after every execution. In his "dying speech," which was as authentic on this as on most other matters, the condemned criminal was always represented as anticipating with greater horror the touch of "Monro's scalpel" than aught else that could come after death.

Time and the decreasing frequency of executions

have gradually effaced this feeling, or prevented its development. But when we consider how many the hindrances were, the wonder is that so many men were educated to the highest skill as physicians and surgeons. The student thus trained had more credit than his successor at the present day, surrounded by all the appliances for prosecuting science which now abound. But no amount of genius, patience, and perseverance can compensate for scantiness of the essential matter on which they are to expend themselves. The practical art of medicine might make shift to go on, but there could be no enlarged science of anatomy, or a full development of physiology and biology, whilst teacher and pupil were debarred from the amplest exploration of the bodies of the dead. It is far from a mere coincidence that those sciences have been totally revolutionized since the passage of the Anatomy Bill.

Chemistry, not less than anatomy, though for other reasons, was also during Edward Forbes's novitiate in the throes of a great change. A corner of the mantle of Joseph Black had fallen, late in the preceding century, on Charles Hope, a lesser but still a considerable prophet. In his hands the Edinburgh Chair of Chemistry had become the most famous in Great Britain; and, except in Paris, it had been unsurpassed in one particular for quarter of a century in Europe. It owed this pre-eminence to the grace and skill with which the Professor illustrated his daily winter lectures by an ample exhibition of happily devised and dexterously executed experiments. Dr. Hope had nothing of the fascinative eloquence or genius of Davy, or of the in-

ventive manipulative skill of Wollaston, or of the penetrating insight of Dalton. His elocution was slow and pompous; his manner cold and ungenial; but he was an admirable expositor, and a most successful public experimenter. Had his love of science or his ambition been greater, he had capacity sufficient to have made himself distinguished as a discoverer. But he was satisfied with the reputation and the wealth which his University lectures brought him, and he fairly earned and deserved both. Experimental illustration of prelections was not a novelty of his introducing. But no one before him, in this country at least, had ventured to give a series of strictly scientific lectures, extending for five days weekly over nearly six months, and each illustrated to the full by experiments. To his honour be it said, he simplified and legitimately popularized chemistry without vulgarizing it. There were no needless blazings of phosphorus, or showy exhibitions of blue lights. A conjuror might have envied his dexterity of hand, but he would have despised the total absence of theatrical display, and have smiled at the serious gravity with which the Professor poured an acid on a lump of chalk, and solemnly expounded why the latter effervesced. He was little loved, but greatly respected by the students; who complained of his chilling, unsympathizing manner, but at the same time acknowledged their obligations to him as a teacher.

Like all other good teachers of a rapidly advancing science, he unavoidably, and to a great extent unintentionally, made his pupils eager for more than even he could give them. The phrase, to "read a lecture," so

common in the English Universities, had, to a great extent, lost its significance in those of the North, and even the word 'lecture' had ceased to accord with its dictionary meaning. Every subject of academic prelection admitting of public experimental illustration had come to receive it, and the lecture had necessarily acquired much of the character of a commentary, often rendered extempore by the exigencies of experiment. The revolution thus effected on the style of lecturing led to further changes. If it were good for the student sitting in the lecture-room not merely to hear a striking physical phenomenon described, but to witness it reproduced and made patent to his senses; and if the great laws of chemistry, heat, electricity, and the like, were rendered doubly intelligible by systematic illustrations of their working on matter, it would be still better if the students could one by one repeat such experiments for themselves, and make themselves thoroughly familiar with at least the leading phenomena, and the more important laws of the fundamental physical sciences. Moreover, in the case of chemistry, a knowledge of its methods of analysis as an art was not less valuable to the physician than a familiarity with its laws as a science.

The want thus felt was long left unsatisfied. A few of the more energetic students, who had sufficient pecuniary means, formed themselves into small societies, and met at intervals in some convenient garret or cellar to try experiments. I have heard my senior colleagues in the University refer to the scenes which occurred at these assemblages—the only "practical chemistry classes" of the earlier part of this century. There were the usual

number of conflagrations and unintentional explosions, with much breakage of glass; and the acquisition, on the part of some, as their subsequent career proved, of both science and practical skill.[1] But suitable rooms, apparatus, books, and teachers were beyond the reach of the majority of students, who, moreover, could not afford to pay for such as were attainable. Dr. Hope gave little or no encouragement to the new movement, which ran counter to his personal tastes, and did not promise to serve his pecuniary interests. But shortly before Edward Forbes began his medical studies, Dr. David B. Reid, beyond the University walls, had commenced a system of instruction in Practical Chemistry which for the time was a great advance. It aimed more at enabling each student to familiarize himself by experiments made under the directions of a teacher, with the properties of the chief chemical substances, and the phenomena attending their action on each other, than at making him a practical chemist in the sense of an analyst; but it did something for him also in this respect. The introducer of this system was a man of great energy, and by satisfying, to some degree, a strongly felt want of the time, laid the foundation of our educational system of practical chemistry. His scheme was far too rough and rudimentary to serve for more than a beginning, but it was easy to graft upon it a better system, and to introduce on its basis the admirable methods of practical instruction in chemical research and analysis which have been prosecuted on a smaller

[1] Two of the most zealous and distinguished performers at these prehistoric practical chemistry classes, were the present Professors of Materia Medica and Clinical Surgery, Dr. Christison and Mr. Syme.

scale by the great chemists of England, but matured mainly in the laboratories of Sweden, France, and Germany. Edward Forbes was a zealous student in chemistry, both under Dr. Hope and Dr. Reid.

Where the two fundamental sciences of the eminently realistic and practical profession of Medicine were thus daily coming before the student in a more concrete form, the cognate sciences could not long avoid a similar change. If the novice could best learn Anatomy by taking up the scalpel and forceps, and dissecting for himself; and could best learn Chemistry by handling the retort and crucible, and familiarizing his own eyes and fingers with the appearance of chemical substances and the modes of manipulating them, was this not also the best plan for learning the other sciences which dealt in concrete realities?

Each physical science, in the ratio of its progress, was feeling the necessity of recognising this principle, in expounding, as well as in acquiring, the truths which it embodied, but each likewise affected, by contagion, all the other physical sciences, and was in turn affected by them. Botany, for example, had always been taught practically in Edinburgh, which has been adorned for generations by an admirable and constantly improving "Physic" or Botanic Garden. The site of this had been altered at long intervals, as the extension of the town rendered expedient. Thirty years ago, although it had not attained its present perfection, it was one of the finest gardens of its kind in the country. An abundant display of plants growing in the open air illustrated the botanical systems. There were large plots set apart for

the more important herbs, etc., used in medicine, and ample greenhouses filled with exotics.

From all those sources were obtained the subject-matter and illustrations of the formal prelections delivered in a pleasant lecture-room in the Gardens, where the foliage of the luxuriant trees, which peeped in at its windows, served as window-blinds, and singing birds took the place of the college bell. Edinburgh, moreover —a city set on a hill—stands in the midst of a rich and picturesque natural garden, possessing a Flora of great variety, and easily accessible to pedestrians. To an extent unknown elsewhere in Great Britain, least of all, perhaps, in London, the energetic and genial professor led his students, each summer's Saturday, on a botanizing march in some direction across the country within a few miles of Edinburgh. In the autumn he headed a smaller party on a continuous excursion of a week or more, to more distant districts, such as Clova in Forfar, Sutherland, the Welsh hills, or the Lakes of Killarney. The field botanists who made these campaigns, acquired a knowledge of plants, such as closet study and the fingering of herbarium mummies, I cannot give. They gained health to the bargain, and enjoyed not a little fun; whilst now and then, like other campaigners foraging in lands not their own, a *casus belli* would occur, and the invaders be accused of forgetting that the fields in which they were reaping what they had not sowed, were the property of neutrals, who could forbid their presence if they pleased. The more thoughtless students alone gave occasion to complaints, which were rare. Genial and hearty though the professor of the day, Dr. Graham, was,

he could become the stern provost-marshal if occasion demanded. But the hearty welcome shown year after year to the University botanizing parties, by those who have long received their visits, is the best proof that the landed proprietors and farmers, whose grounds were traversed, were willing to excuse a little youthful folly, for the sake of the good which so largely preponderated.

Taught in this way, Botany had long been in Edinburgh a favourite study with the more accomplished students of Medicine. It had attractions also for the more discursive students in Theology; and in truth, there was a greater mingling of students of all the Faculties, as well as of amateurs, at the Botanic Garden, at lecture time, than in any other place connected with the University. But the science thus cherished had great advances to make. Impelled by the hidden law of its own progress; furnished day by day from every quarter of the globe with new materials to analyse and systematize; provided with new instruments of research, and beckoned to new discoveries, by the illumination cast on its darker regions by the ever-brightening light of the advancing sister sciences, and the ever-increasing demands of the progressive industrial arts, Botany was about to take a bound forward, which soon rendered new appliances for teaching it requisite on every side.

In the earlier student days of Edward Forbes, it was a dispute among the students whether Professor Graham, who was an accomplished botanist for his day, had *six* or *seven* diagrams to illustrate the structure of plants. A microscope was never seen in the class-room, and

the majority of students could not have told with confidence which end of the tube should be put to the eye. No instruction was given in dissecting or examining plants, further than by pulling them to pieces with the fingers, and examining them with a pocket lens. There was no subdivision of the class into sections, who, in convenient small groups, could be tutorially taught from the systematic arrangements of plants in the garden, or the rare exotics in the greenhouses. Finally, though every student was laudably encouraged by precept, prize, and example to collect a *herbarium*, and preserve a *hortus siccus* of the smaller plants, a mausoleum of the giants was unknown, and a museum for them would have seemed to most, like a sepulchre in the midst of a garden of roses.

Long before Edward Forbes returned to Edinburgh, all was changed. Steamships were carrying adventurous botanists to every region of the globe, and bringing back unlooked-for plants and vegetable products to delight the eye of the philosopher, and the hand of the worker. Men of remarkable genius were, with unexampled rapidity, turning those treasures to account, and tracing with every mechanical, optical, and chemical help, the structure or anatomy of plants down to the *minimum visibile*. Others were studying their functions or physiology, the laws of their reproduction or development, their geographical distribution, generic and other alliances, and all in addition that makes up the scientific record of plant-life, with equal energy and success. The kindred sciences of Animal Anatomy and Physiology, advancing in their own line with similar rapidity, were

largely assisting, by their side lights, the solution of many problems, in Botany.

Geology had recovered to the light of day the lost plant-world of the past, and the botanist had found the existing plant-life acquire a new meaning when compared and contrasted with it.

Organic Chemistry was at length able to add rapidity to accuracy in its analyses of vegetable (and not less of animal) substances, and Inorganic Chemistry had vastly multiplied its analytical resources. A new chemical foundation was thus laid beneath Botany as a science, and Agriculture as an art, and the relations of a plant to soil, air, and water, could be reasoned about from an abundance of quickly collected, yet trustworthy, data, such as antiquated even modern text-books, with unheard-of rapidity.

Industrial Art on every side was welcoming and turning to unexpected account the foreign timbers, bread-stuffs, dye-woods, drugs, resins, gutta-perchas, oils, waxes, textile fibres, and the like, which were revealed to it, by tantalizing importations, as abounding in strange lands. Museums, where indigo, cotton, palm oil, caoutchouc, and all the other raw materials which vegetables furnish to the arts, might be seen and studied by practical men, were, one might say, creating themselves in different parts of the country.

Thus it happened, that within a very short period after the appointment of a new Professor of Botany, in the person of Edward Forbes's friend, Dr. Balfour, the science he taught burst into a fulness of foliage and a richness of flower, like the quick budding in spring of a Canadian

forest, whose leaves, travellers tell us, expand audibly and visibly, and deepen in colour even while you gaze upon them. The seven diagrams of the class-room soon multiplied to many hundreds. Microscopes were provided. The students were shown through them the actual plant tissues, were taught how to prepare microscopic sections, and how to handle the microscope.

Arranged in convenient detachments they listened to the Professor's *al fresco* disquisitions on the plants growing in the open garden, and in turn visited the greenhouses along with him. A new lecture-room, light and airy, replaced the old one, and the site of the latter was occupied by a museum where preserved fruits, seeds, sections of timber, casts and models of plants, and their organs,—the fossils of the Coal Measures, and of other geological formations,—microscopic sections of recent and extinct plants,—photographs of such sections,—the raw industrial material derived from the vegetable kingdom, and the manufactured products obtained from these materials, besides many accessary specimens,—were at all times open to inspection. The garden meanwhile was extending its area, the greenhouses were enlarging and anticipating the period since come, when a new and splendid Palm-house should supplement their range. The rapid extension of railroads, and multiplication of steamboats were every day magnifying the regions accessible to the botanical excursionists. This week, Dr Balfour's party were clambering up the Bass Rock, gathering, in the midst of the perplexed solan geese, its scanty but curious flora. Next day, after bathing in a body in the sea bay of Burntisland, they were scouring

the kingdom of Fife. The week after, you heard of them as having invaded Arran in the Clyde, and pushed their foraging parties to the very summit of Goat Fell. When the academic session was over, they were no longer content with trips to the more distant corners of their own land, but organized excursions to the Continent. Beardless faces came back bearded; English sticks had been replaced by Alpenstocks. You heard much of glaciers, and were shown photographs of your friends in their field costume, looking very disreputable, and like so many scarecrows.

Of the seminal beginning of these changes, Edward Forbes was a witness; of their later development he was to some extent a cause.

If Anatomy, Botany, and Chemistry were thus advancing, it was impossible that Natural History, which is their complement, and much more, should remain at rest. On the other hand, carried forward by the combined flood of all their swelling tides, and adding its own *vis viva* to the stream, it was altering more rapidly than any of them. It was represented in the University of Edinburgh by Professor Jameson, who had won for himself a European reputation as a naturalist, and was surrounded, when Edward Forbes first made his acquaintance, by a band of eager students of Natural History, some his peers, others his pupils. Jameson was a remarkable man. Grave, taciturn, and reserved in manner, devoted specially to Mineralogy, the narrowest in some respects of all the departments of the science he professed, he seemed much better fitted for the secluded life of a student, than for the duties of a University chair.

Nevertheless, there was in him a deep, quiet enthusiasm for his favourite science, which his ungeniality of nature could not prevent being contagious, and he became, what many of his brilliant colleagues failed to become, the founder of a School. The spectacle of his perseverance, earnestness, and life-long devotion to his work, overcame the effect of his taciturnity and reserve. These were incurable peculiarities, which probably he would have been as well pleased as others to exchange for their opposites. After all, however, they formed only a tough rind to the man, like that of the pomegranate, which when pierced yields a pleasant juice, fragrant and sweet, though not without acidulous sharpness. Intercourse with him, accordingly, soon dispelled the notion that he was a man wrapped up in himself, happy only when fingering or scratching minerals. Side by side with some of the narrowest opinions, which he held and defended most obstinately, was a wide and intelligent sympathy with the progress of every department of physical science. Nor was this sympathy inactive. The Wernerian Society, which he founded, named after a mineralogist, but including every class of naturalists, and discussing every branch of their science, was one evidence of the catholicity of his scientific tastes. Another was the *Edinburgh Philosophical Journal*, the editing of which was to him, for half a century, a labour of love. Of all the scientific journals I have encountered, it is the most varied and multifarious in its contents, and it was not edited by proxy. But the greatest proof of the broad view which Jameson took of the territory rightfully belonging to Natural History, is to be found in the Museum

he collected at Edinburgh, where it remains a memorial of him, and is every day receiving additions.

Of this Museum, and the peculiar attractions which it had for Edward Forbes, we shall have much to say again. At present it concerns us as marking, by the nature of its contents, the condition in which Natural History was when he recommenced study in Edinburgh. I had known the Museum from boyhood, and would have been glad to have known so delightful a place a great deal better, but the charge of a shilling, which was then exacted for admission, was often beyond the holiday resources of a schoolboy's pocket. Still, I visited it sufficiently often to know its general arrangements, some of which yet remain unchanged. The larger vertebrates, and especially the mammals, were well represented by stuffed specimens. Of stuffed birds there was a large and very fine collection; and in mineralogy, as might have been expected from the tastes of the Professor, the Museum was peculiarly rich. Of shells, there was a goodly show, and of insects there was understood to be a large collection, which was not usually displayed, as light is highly destructive to the specimens. Fishes and reptiles were represented, to some considerable extent, by preserved and mounted skins, and there was a highly interesting, though not very numerous assemblage, of the skulls of different nations, which, however, was not open to general inspection. Besides the objects enumerated, there was the usual array of miscellaneous varieties,—the tatooed head of a New Zealand chief, an Esquimaux canoe, a narwhal's horn, a brain coral, and much else, scattered here and there through the Museum after a

fashion which is fast being abandoned. Moreover, a large number of specimens, in various departments of Natural History, were unavoidably shut up in store-rooms and cellars, from want of space to display them. The Museum, however, could not but be considered as tolerably ample in its dimensions.

The lower hall was almost entirely occupied by large stuffed quadrupeds and other mammals. The upper hall was devoted to mineralogy, and in part to birds, to which also the greater part of the galleries was consigned. The remaining objects were accommodated in side-rooms, or disposed of in corners.

With all its defects it was a highly instructive Museum, and Jameson made excellent use of it in illustrating his lectures. It was too much, however, regarded by the Professor as an appendage to the lecture-room. He resisted to the last throwing it open to the public, and those who paid a fee for admission into its halls, did not find them so occupied, arranged, and placarded as to make the Museum what if possible every museum should be, a self-interpreting, illustrated series of treatises on the various groups of objects it contains. Great deficiencies, moreover, existed in it. None, perhaps, was more remarkable, considering the splendour of the mineralogical collection, than that shown in the case of Geology. Some specimens of rocks and fossils there were, but no series of illustrations representing the stratigraphical, palæontological, or industrial relations of the several geological formations. The student was not furnished with the means of familiarizing his eye with the lithological or mineralogical characters of even the igneous rocks, still less with those

of the sedimentary strata. No systematic collection existed of the fossils which so strikingly characterize the majority of the aqueous rocks. Nor was there any provision in the way of drawings, diagrams, models, classified ores, slags, metals, and the like, to enable the mining engineer to learn how and where to look for coal, for limestone, black-band, or lead ore, and how to recognise them when he encountered them.

It would be the height of folly to complain that these geological desiderata, as yet but very partially possessed by us, were not attained in any degree, quarter of a century ago. Jameson could not have got them, whatever efforts he had made. Directly he perhaps made no efforts, but indirectly he trained or influenced the men who, like Edward Forbes, have changed our museums from sepulchres, sacred to death and silence, into temples where the Pythoness is always present, and always inspired, and the oracle is never ambiguous.

Mineralogy, even, the special glory of the Museum, was represented solely by specimens in their natural condition, which, however, were the finest attainable. Neither the crystallographic, the optical, the chemical, or the industrial relations of minerals received any illustrations. Great deficiencies also existed in the zoological department. With the exception of insects, the invertebrate animals had no visible recognition in the collection, and the millions of sea-creatures, of lower grade than fishes, which Edward Forbes made his special study, were acknowledged as worthy of admission only in so far as they left behind them after death, shells of sea-marble or of mother-of-pearl, which were as beautiful and as lasting as minerals.

Of no class of animals, moreover, high or low, was there any series of specimens illustrating its internal structure. Skeletons; separate organs and dissections of important tissues preserved in spirits; enlarged models of minute structures; microscopic sections; diagrams and drawings were almost totally wanting. In other words, comparative anatomy was not regarded as an integral and inseparable part of the zoological department of Natural History, but was handed over to the human anatomist, who fortunately in many cases accepted the transfer, although in reality comparative anatomy was free alike to the naturalist and the anatomist, but under the imperative restriction that each should cultivate the common territory, or pay the penalty of seeing his own science languish, if he did not.

In a word, the Natural History of Edward Forbes's novitiate and Professor Jameson's prime, was too much, so far at least as taught, a science dealing only with external characters. The density, hardness, colour, lustre, crystalline form, and one or two other sensible properties of each mineral were carefully noted; the chemical composition was recorded with little or no commentary, and there the inquiry ended, and the mineral was assigned its place in a system. The great majority of the animal specimens were simply stuffed skins. Of some creatures there were only skeletons. Of a very few both the skin and skeleton were preserved; but all that lay between the integuments and the bones was unrepresented. In the estimate even of the educated, the prevailing notion of a naturalist was of one who knew by sight, and could draw, describe, and classify a great number of rocks,

minerals, shells, plants, animals, and it might be also clouds, auroras, mock suns, and other meteorological phenomena. In the case of animals, it should be added that the naturalist was understood to be largely familiar with their habits during life, and the older observers were certainly as skilful at watching these as any of their successors

No one of the great naturalists in reality belonged to this skin-deep school. They knew that peculiar external characters were the result or counterpart of peculiar internal structure. They knew that systems of classification were to a great extent only matters of convenience, and that they had a scientific value only in so far as they recognised all the affinities, analogies, and relationships which linked together the objects of classification. But they felt this more fully than they expressed it, and the majority of their hearers did not perceive that they felt it at all.

It was plain that such a state of matters could not last. Jameson begat a love of Natural History in his students which could not be fed upon dried skins and glass eyes, or arrangements of living creatures in artificial groups as little true to nature, in many cases, as those in which children rank the contents of a Noah's ark. The crisis was precipitated by the resolution of the Senatus Academicus of the University of Edinburgh, soon after Edward Forbes entered it, to make the study of Natural History imperative on all who proposed to graduate in medicine. This implied recognising Natural History as a subject on which candidates for the title of Physician should be examined by the Medical Faculty, and the

entire University thus became interested, and entitled to interfere in settling the best mode of teaching the science.

It would be doing Jameson great injustice to impute to him any active opposition to the changes which now began. Too advanced in years, and by nature too strongly conservative, to be himself an active revolutionist, he allowed others, such as Edward Forbes and John Goodsir, to devote their zeal and genius to the initiation of reforms which should gradually undergo accomplishment. But though his sympathy was but dryly expressed, and less wise innovators than these favourite pupils received, instead of encouragement, only a caustic hint to let well alone, he was no enemy to progress. He had witnessed so many swift revolutions, and so many silent progressive changes in science, that to learn of a new one could not startle him. Neither had he been a great discoverer whose fame was identified with observations which later discoveries might dwarf or eclipse, nor an extreme partisan who, for the sake of his character for consistency, must uphold to the last whatever views he had once maintained. An eclectic, not a dogmatist; a critic and expositor, rather than an originator; and a wide and diligent reader of the current scientific literature, he had, all his life long, been like one afloat in a discovery-ship on a mighty unknown river. Now there was swift sailing, and then long anchorages; floatings back and forwards as the tides ebbed and flowed, but no end to the voyage. The river grew wider and more attractive as the vessel sailed on; and though elderly passengers were constantly disembarking and

declaring that behind them was the Garden of Eden, and before them a desolate wilderness, yet their places were more than supplied by youthful adventurers for whom the horizon was without a cloud, and all the future full of smiles. The grave professor neither disembarked, nor asked of the future more than of the past; he had voluntarily articled himself to the ship, and would remain on board till he got his discharge. The experiences of Jameson were indeed those of an Ancient Mariner. In his early youth he had known Geology as a territory belonging of right to the Sea-gods, and had fought under Werner with failing fortunes, till Hutton won for the Fire-gods one-half, if not more, of the disputed territory. Then came a third set of claimants, who professed to acknowledge both of the older ones, but all the while mocked at Fire and Water as the monarchs of the globe, and stole from each one half of his territory, erecting a separate but professedly tributary kingdom, which they called Palæontology, and summoned the spirits of all the dead plants and animals to defend. He had seen the concrete crystallography of his early days, which built up a great cube out of a multitude of infinitesimally small ones, and acknowledged an infinity of primary forms, replaced by an abstract scheme, dealing in ideal axes, arranged in a very few sets or systems, each of which supplied a sufficient scaffolding for a number of geometrically related forms. The one optical marvel of certain transparent minerals, that they refracted light doubly, had grown under his eyes into a multitude of marvels, as day by day the existence of optical as well as geometric axes in transparent crystals, was more and

more clearly recognised, and their power to polarize light, and the action of polarized light upon them, were brought into view.

As for the chemical characters and composition of minerals, they had, if possible, assumed in his experience still more novel aspects than either the crystallographic or the optical. A reference indeed to Chemistry may close this section. Jameson had heard the last dying echoes of the battle between the partisans of the phlogiston and the antiphlogiston camp. He had long ended his chemical studies before the names of Galvani and Volta had been heard of in England, or the Voltaic battery had been invented. The whole of Davy's career was within his cognizance. Dalton's atomic theory slowly struggled into acceptance under his eyes. Berzelius revolutionized before him the entire chemical department of Mineralogy. Mitscherlich established a connexion between crystalline form and chemical composition; and Organic Chemistry changed from a crude system of drug-making, into an elaborate storehouse of essential bases, acids, and other principles, and became, as we have seen under Botany, as perfect in its analyses and system, as Inorganic Chemistry had already become.

To one who had seen so many changes, what was one more? To one who had never witnessed rest, its postponement was no surprise and no trial. The sciences which make up Natural History had been, from the first moment Jameson had known them, like so many armies in the field,—now advancing, now cross-marching, now bivouacking, now halting even for a long season in

winter quarters, but never retreating; while now one, and then another, and sometimes several, formed themselves into movable columns, and struck across the unknown region before them,—passing rivers held impassable, surmounting hills held insurmountable, and permanently occupying new ground; the old being in part abandoned, in part marked by fortresses and memorials, where trophies were preserved and famous deeds commemorated. In these citadels the old soldiers who were past campaigning found a resting-place, and believed, or tried to believe, that all that was worth fighting for had been won. But the veteran of whom we speak, though his militant days were over, followed the marching regiments in his litter, and watched with keen interest the tactics of the young generals. They took their own way, and he grimly or graciously bade them God-speed. He encouraged his younger colleague, James D. Forbes, in his beautiful and elaborate researches on the glaciers. To him, Edward Forbes dedicated the first-fruits of his explorations in the sea; and John Goodsir consulted with him about those investigations in Comparative Anatomy, which, even in his student days, gave promise of the fruit they are so richly producing.

Under a grave eclectic like this, Natural History peacefully passed through a great crisis, and probably underwent a much more equal development in all its branches than it would have done under a more original but more one-sided master.

If we look back for a moment at the characteristic aspect of the phasis through which the "Natural His-

tory sciences" began to pass when Edward Forbes commenced their academic study, we shall find that the chief transforming influences were exerted from two centres of change. The one had reference mainly to Vegetable and Animal Anatomy and Physiology, including Botany and Zoology, and the palæontological half of Geology, or, in a word, Biology—the science of living things—from man downwards to the smallest monad. The other had reference to Chemistry, a peer of the first rank in the kingdom of life; ruler of high degree over every creature during its active existence, and a judge from whom, in one vast department, there is no appeal, when death has set his seal on each organism. The inorganic half of Geology, and all Mineralogy, were largely affected by both influences, but were likewise under the control of special modifying agencies which told less or more upon the Biological Sciences.

The one centre of change had for its effective weapon the microscope—the *revealer of structure;* the other the combustion tube—the *revealer of organic chemical composition.* The former was the anatomist's tool, the latter the chemist's; and both instruments, in the hands of these workmen, were at the service of all the Physical Sciences which examined minute mechanical structure or chemical composition.

The microscope was no unheard-of novelty. The service it could render science had been demonstrated by Robert Hooke, to mention no others, in his *Micrographia*, some two centuries ago. From that time downward, philosophers and artists had by happy discoveries and inventions continually improved it, till it had be-

come a marvellous instrument. All the great observers in Natural History were familiar with its use; and it was in the hands of students like Edward Forbes or John Goodsir, and regarded as an indispensable instrument by them, years before it acquired the dominance we are discussing. Nevertheless it was still an instrument understood and handled by few, and by such was regarded with much the same feelings as an enthusiastic musician regards his Cremona violin, or as, till recently, a sportsman would have regarded his Manton rifle. There was no choice between a costly instrument, far beyond the resources of most students; and a Birmingham toy, which, useless for research, was the dearer instrument of the two. Suddenly the microscope became the subject of a series of improvements as numerous and thorough-going as those the musket has undergone within the last very few years. Solicited and encouraged by the naturalists of all countries, and guided by the most accomplished physicists of the day, the practical opticians of Italy, Germany, France, and England, vied with each other in raising the power and lowering the cost of the microscope, till a good instrument was within the pecuniary resources of every student. For ten pounds you could procure a better instrument than fifty pounds would have purchased a few years before, and for half the latter sum, such an instrument as no money could have procured shortly before. The effect of these improvements rapidly appeared. Within ten years of Edward Forbes's arrival in Edinburgh, the army of microscopists which in the interval had come upon the field, had turned their weapons to so good account, that they had

won a territory entirely to themselves, and men heard with surprise of a new science called Histology, literally, "the Science of Tissues," more fully, "the microscopic exposition of the minute structural peculiarities of plants and animals." The Continental physiologists soon introduced the systematic instruction of their pupils in the use of the microscope, and, in 1841, similar classes were commenced in Edinburgh by Dr. John Hughes Bennett, a fellow-student and intimate friend of Edward Forbes.[1]

The microscope has now become the fashion. It is an indispensable article of furniture in a physician's consulting-room, whether he uses it or not; and under a glass shade is as graceful as a time-piece. Nor is the fashion one which will soon pass away. Neither physician nor physicist of any class can afford to ignore it, so wondrously has its employment enlarged the boundaries of every science which deals with visible structure. It is needless to notice here that the eye only sees what it brings the power to see, whether naked or armed with a microscope. The tools are nothing without the skilful hand to handle them. But an improved tool improves the skill of the hand, and here also of the eye which, together with the hand, uses it. The trained hand and eye soon perceive how their common tool may be made more

[1] Dr. Bennett, now Professor of the Institutes of Medicine in the University of Edinburgh, has the merit, if I mistake not, of having introduced the practical study of Histology into Great Britain. His first course of instructions, given when he and I were extra-academical lecturers in the Medical School, Edinburgh, was delivered in my lecture-room, which I placed at his disposal, knowing that a first course of an unheard-of science must prove unremunerative. Histology was then as much a *verbum insolens* as at a later period Technology was found to be. In both cases, Greek lexicons were opened and closed, without making those who opened them almost anything the wiser.

perfect, and the tool thus further perfected trains them to a higher skill. This in its turn realizes a still more perfect tool; and so acting and re-acting on each other, the microscope and the microscopist have brought us to our present advancement, where ten years reveal more of the laws of structure, growth, development, form, progressive change and ultimate decay, than ten centuries did before. The words Histology and Morphology refer only to the services of the microscope to organic nature, but there is a wondrous inorganic microcosm also, where already it has reaped rich harvests, and where far richer ones await reaping.

The organic *combustion-tube* is a much less familiar instrument than the microscope. The laws of light which determine the construction of the latter, were known long before the nature of the chemical elements, and their modes of combination which determine the methods of chemical analysis, were discovered. The same Robert Hooke, who in the seventeenth century saw so fully the value of the microscope, had a clear glimpse, along with many of his contemporaries, of the combustion of an organic substance as the way of analysing it. Tradition reports that in an earlier age, Sir Walter Raleigh illustrated this practically before Queen Elizabeth, making what a modern chemist would call a quantitative analysis of a pipeful of tobacco which he smoked in her presence; but if in truth the story be trustworthy, it only shows that Sir Walter had not forgotten what as a student he had read in Aristotle.

Organic chemical analysis as now practised, cannot date farther back than the period when water was dis-

covered to be a compound of hydrogen and oxygen, and carbonic acid to be a compound of carbon and oxygen; and these discoveries were not fully realized and appreciated till the very close of the eighteenth century. It then became possible to analyse all vegetable and animal substances which consisted only of carbon and hydrogen, or of these and oxygen also; for the carbon could all be burned into carbonic acid, and the hydrogen could all be burned into water, and from the weight of carbonic acid and of water, yielded by a given weight of organic substance when burned in oxygen, the weight of carbon and of hydrogen, contained in the compounds thus yielded, could always be calculated; whilst, where oxygen also was present, it was represented by the difference between the sum of the hydrogen and carbon, and the weight of substance originally burned. The principle thus established, was soon and successfully applied to the analysis of *gases*, such as the carburetted-hydrogens produced by heating wood, coal, wax, and oil, but it was found immensely more difficult to apply it to these substances, even when they consisted of the same ingredients as the gases derived from them, which were so easily analysed. It was equally difficult to apply the principle to the similar compounds which abound in plants and animals; and the more complex combinations were totally beyond ordinary analytical reach.

There were chemists, indeed, of genius and skill sufficient to master all these difficulties. Berzelius in Sweden; Gay-Lussac and Chevreul in France; Faraday and Prout in England; and Walter Crum in Scotland, had each succeeded, by methods of his own, in analysing

the most complex organic compounds. But they demanded time. You must not hurry them. The processes were delicate: many precautions were necessary; the utmost care could not prevent frequent failure; you must allow yourself days for the analysis of a single substance. To this requirement none could object. An inaccurate analysis is not an analysis at all. But if each organic body were to consume days in its analysis, at what rate of progress would the millions of vegetable and animal substances be analysed?

Ingenious arithmeticians were spared the trouble of calculating this question. A few modifications of the apparatus already devised, a few additions to its simple machinery, one or two substitutions of one material for another, and a great reduction of the scale on which the apparatus was made and worked, removed every difficulty. But very simple as the changes seemed to be, it took much experience and skill and genius to effect them. They were owing to the chemists already named, and, in addition, to younger men, among whom none will grudge a pre-eminence to Dumas of Paris, Mulder of Utrecht, and Mitscherlich of Berlin; but beyond all question they were mainly due to Liebig of Giessen, where he made them, now of the world.

With his combustion-tube, the analysis of an organic compound became, from a work of days, a work of hours, and by and by, a work of minutes. Before the first decade of Edward Forbes's student life had ended, Liebig's earliest work on Agricultural Chemistry, commissioned by the British Association, was laid before it at its meeting in Glasgow (1840), and from that date

the power of organic chemistry to alter and extend the organismal sciences, was felt and acknowledged by all.

Of the more practical medical sciences it is not necessary to say much. With Anatomy, Chemistry, and Physiology rapidly transforming themselves, they could not possibly stand still. They were also, however, assisting themselves. The physician, including the surgeon, had come to stand in so important a relation to the judge, as the detector of the cause of death in doubtful cases, the appraiser of the effect of injuries on the living frame, the discriminator between sanity and insanity, the chief witness in cases of alleged infanticide, and the decider of legitimacy of birth—besides otherwise assisting in deciding questions of civil and criminal law—that a new branch of science was recognised, linking Medicine and Law together, as its alternative titles, Medical Jurisprudence and Forensic Medicine, imply. A chair of Medical Jurisprudence had been established in Edinburgh, in 1807, and was occupied when Edward Forbes joined the University, by Dr. Christison, who had filled it since 1822 with great distinction. In particular, he brought his extensive acquaintance with chemistry, and skill in analysis, to bear on the important subject of Toxicology, and so simplified and improved the methods for detecting poisons by devices of his own, as well as by judicious adoption of those introduced by the ablest toxicologists, that the fraction of a grain of arsenic, or one drop of prussic acid, could be unequivocally detected and identified. It soon came about that, whereas lawyers and doctors had equally shrunk from poisoning-cases as always unsatisfactory to deal with, Toxicology became,

so far at least as the question of administration of poison was concerned, the most certain department of Medical Jurisprudence. A student of a few weeks' training will now unhesitatingly decide, after some hours' trial, whether a suspected substance contains an appreciable quantity of arsenic or not; but till Orfila and Christison, and their successors, found out the way, the most accomplished physicians were often at fault.

In 1832, Dr. Christison was transferred to the chair of Materia Medica, which, including in its wide province dietetics and medicaments, could not but be specially affected by the new light which Chemistry afforded in reference to the composition of food and of drugs, and was certain to gain by its transference to one who could bring a large acquaintance with Botany, and great accomplishment and skill as a chemist, to supplement his experience as a physician.

In his hands the subject of Materia Medica soon became one of the most attractive to students. A museum, still in many respects unrivalled, was by indefatigable exertion furnished, step by step, with illustrative specimens. Many of these were botanical, a few mineral, gathered from all quarters of the globe. A large number were chemical, and were chiefly prepared in the laboratory attached to the lecture-room, where, assisted by some of the more zealous lovers of chemistry among the students, the Professor spent many hours each day in chemical research.

As one of these assistants, I speak from personal experience to the profound impression of a mighty change passing over Medicine as an administratrix of substances,

which in one sense are food, in another medicine, in another poison, which my daily laboratory work made upon me. Together with a gifted fellow-student and fellow-chemist, the late Samuel Brown, I often, as we watched a process, wondered at the changes which ourselves had witnessed, and with the hopefulness and confidence of youth, echoed the prediction that these were but the first-fruits of a far more wondrous harvest which should yet be gathered. And if we looked sometimes in the wrong direction for the harvest, and the fields are still barren which we thought would first have grown green, deserts have blossomed in other quarters where we had no hope of a flower. In our most sanguine dreams we never entertained the prospect of a whole new class of remedies being introduced, under the title of Anæsthetics, or foresaw what mercy was in store for mankind, in ether and chloroform. But a walk round the Materia Medica Museum, or a day's work in the associated laboratory, was enough to awake wonder and boundless hope. Instead of the pounds of cinchona sawdust which the patient had formerly to swallow before his ague could be cured, a few grains of silky, white crystals of quinine were found sufficient to dispel the fever. Poppy-juice, instead of being dried up into a confused mixture of acids, alkaloids, gum, resin, caoutchouc, and many other compounds, constituting a capricious soporific of uncertain strength, was subjected to an orderly analysis. Under skilful hands the dark-coloured, heavy-smelling opium resolved itself into colourless, odourless crystals of many different kinds, one of which —morphia—concentrated in itself, as its name implies,

the chief, if not the entire, sleep-producing, anodyne virtues of the opium. The purified salts of this, far less liable than the crude drug to disagree with the patient, could be weighed to the fraction of a grain, and administered in the most nicely-proportioned dose to the wakeful, agonized sufferer. The poppy had betrayed a long-kept secret. In every medicinal plant there was an essence or quintessence, small in quantity, but in which lay the whole therapeutic virtues of the plant. Extract that, and there remained so much hay and shavings or saw-dust. You had washed the sands of a gold river; the grains of gold were few in number, but you had them all; the sand retained no trace of metal.

By distillation; by treatment with an alkali; by treatment with an acid; by crystallization; by one or all of these processes, or by others, the essential oil, or alkaloid, or acid, or neutral principle, on which the medicinal powers of each plant depended, was extracted and purified. New tonics, narcotics, anti-spasmodics, anæsthetics, and the like, were presented to the physician in forms so pure and concentrated, that of many a single drop, or the fraction of a grain, was an ample, nay, a perilous dose. The scientific pharmaceutical chemist, however, did not stop here. He put the question to himself; might not some of these potent morphias, strychnias, quinias, which as yet we can procure only by extracting them from plants in which they occur ready formed, be *produced* artificially? What, for example, if we could manufacture that precious febrifuge, quinine, from some of the comparatively cheap substances resembling it in composition, instead of obtain-

ing it at great cost and labour from the bark of foreign trees brought across the seas?

The possibility of achieving this was no vain imagination. Already we could produce, from inorganic ingredients, the prussic acid which renders the bitter almond and the laurel leaf poisonous, and supply it pure and concentrated in any quantity. We could from similar ingredients produce substances as complex as quinine, and resembling it in many properties. There was here a still more exciting and attractive prospect than that which the extraction of ready-formed quintessences furnished. How vastly enhanced must the resources of the healing art become, when the chemist could produce morphia without help from the poppy, and strychnia without having recourse to nux vomica! In the quarter century that has passed since these hopes were first awakened in the Edinburgh students of 1830, they have been unexpectedly fulfilled. Now that we can produce artificially, and from waste and even noisome materials, the ethereal liquids to which the fragrance of the pear, the pine-apple, and the melon are due; and can manufacture "spirits of wine" from coal gas and oil of vitriol, we can scarcely be over sanguine as to what we shall yet effect, as competitors with living organisms, in the production of certain compounds.

This, however, was not all. Besides extracting the quintessences which Nature had so diligently hidden and diluted through the mass of each medicinal plant, as well as infringing, or, as it were, breaking Nature's patent for manufacturing them, might it not be possible to produce compounds which, though no plant yielded them, and for

manufacturing them none guarded a secret or claimed a patent, were nevertheless as powerful in their action as any natural acid, alkaloid, or oil? In reality the question had been practically answered for centuries. For what were alcohol, sulphuric ether, or acetic acid, but artificial organic compounds, produced, at least at second-hand, without the help of organisms? In this direction, however, we had hitherto done very little. Nearly all our mineral medicines, and especially the most potent ones, were, like the preparations of lead, antimony, mercury, and arsenic, products of the laboratory, but the reverse was the case with the remedies derived from the vegetable and animal kingdoms. Now it became apparent from the triumphs of the purely scientific chemist, that the manufacture of organic compounds was a much more easy process than we had imagined, and that we could not fail to produce novel substances possessed of the most energetic physiological action. Chloroform, in the meanwhile, is by far the most striking example of this that can be referred to. Those, however, who are familiar with the remarkable properties of the novel so-called organic metals, containing arsenic, antimony, and tin; of the similar compounds containing phosphorus; of the new ammonia-bases and related bases; and of the endless "substitution" compounds, every day swelling the list of organic bodies,—will not doubt that there are as many new medicines as there are new groups of chemical combinations.

All this was dawning on us in the 1830 decade, filling us with boundless hope. The spirit of the alchemists was in us, but we had realized that it was not

an elixir of life, but an elixir of health, that we had to seek. Death we cannot vanquish, but suffering we may. Many a sharp skirmish there must be with pain; and with "all the drowsy syrups of the world," and all the anæsthetic Lethes, we must, at every cost, "steep the senses in forgetfulness." But our ideal man is not a dreamy, painless, lotos-eater, but a stalwart athlete, who can endure hardness, and whom we would help to the possession and conservation of a sound mind in a sound body. Die he shall, but whilst he lives we shall try, by wisely chosen food, and drink, and medicine, to make his life long, and his labours abundant; and his death shall be the peaceful lying down to slumber of the healthfully tired child, before whom there is the prospect of a blissful morn and a happy awaking.

The most practical, nominally, of all the branches of Medicine, namely Practice of Physic, was not less characterized at this period than its sister sciences and arts, by a new weapon and index of progress. If Biological Science had its later development sufficiently indicated by the one instrument, the microscope, and Chemistry its later development sufficiently indicated by the one instrument, the combustion-tube, Practice of Physic had laid its hand on the stethoscope, invented by the ingenious French physicians, and in two or three years could train the novice to distinguish diseases of the chest with an accuracy and rapidity, such as the experience of forty years had often failed to bring to the unweaponed physician.

In 1832, the stethoscope was still upon trial. The

general public had scarcely heard of it. When ladies chanced in church to notice it stretched for convenience of stowage within the hat of some doctor, they set it down as a hat-stretcher, and its possessor as a fop. When I entered the Infirmary in 1833, the younger physicians were still shaking great bottles partially filled with different liquids, to ascertain the cause of those murmurs and ominous rattles which the stethoscope, when applied to the chest, reveals and bids us interpret. This was a rational and instructive proceeding, to which, among other things, we are indebted for the skill which has characterized the Edinburgh stethoscopists; but it was followed only by the younger or middle-aged men. The seniors, suddenly called upon to train their ears, dulled by time, to the discrimination of an apparent wilderness of sounds, shook their heads and stood silent aloof. Here and there, one or two bolder than their brethren mocked at the novel instrument. Conspicuous among these was the late Dr. James Hamilton, predecessor in the Edinburgh Chair of Obstetrics of the introducer of chloroform,—a sagacious, skilful physician, witty withal, and in many respects accomplished.

The stethoscope of his day was a cylinder of mahogany, a foot and a half long, with a canal running down the centre in the direction of its length. Afterwards, this somewhat unwieldy instrument was replaced by the short narrow tube, resembling a small clarionet without side holes, and with a flat ear-piece, which is now in use, and was readily enough mistaken for a hat-stretcher when seen inside a hat. Dr. Hamilton used yearly to amuse himself, and still more his class, by producing a stethoscope

as big as a pastry-cook's rolling-pin, and observing with mock gravity, rapidly changing into sarcastic laughter, "that some gentlemen professed to be able to hear through a stick;" the stick thus judged was thereafter derisively flung on the lecture-table.

It is difficult to believe that such a judgment was, less than thirty years ago, pronounced *ex cathedra* on the stethoscope. That it was, is the best proof I can offer of the swift change which was passing over even those departments of Medicine which are supposed to gain only by many successive experimental additions.

It is years already, since, putting aside purely medical circles, the thoroughly practical managers of our life insurance offices, desirous to enrol those only for whom longevity might reasonably be anticipated, realized what assistance the stethoscope could render them in weeding out the bad lives from the good. Every day, in the hands of those skilled in its use, it detects not only the wilful, but also the unintentional deceiver, whose heart or lungs have not yet revealed to himself the frailty which they could not conceal from the physician's inquisitorial ear.

I will not connect Surgery with any of its more positive instruments. It will be more agreeable to unprofessional readers to think of it in connexion with one of its least appalling *armamenta*, namely, the anæsthetic inhaler, which, reversing the usual law of development in machines, has passed from great complexity into nothing more elaborate than the fold of a handkerchief or the corner of a towel.

Anæsthesia, as now brought about by surgeons, had

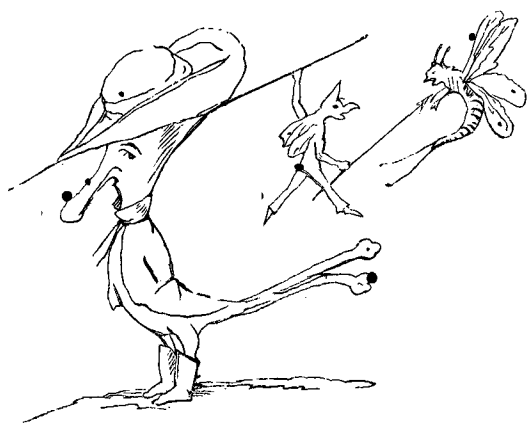
not been dreamed of in 1833, nor is its induction strictly speaking an act of surgery, but a preparation for one. The Hospital, also, rather than the University, is the proper arena of the surgeon. It may suffice, therefore, to say, that the fame of the Edinburgh surgeons had never been higher than when Edward Forbes began his medical studies there. An entirely new Surgical Hospital had just been completed, where students, from all parts of the world, witnessed men like Liston and Syme perform operations unheard of before, such as only the boldest and most skilful dare attempt, and only the most experienced and sagacious could conduct to a successful issue. On this point I do not dilate; but it must not be forgotten that Surgery, no less than the other branches of Medicine, was stirring with fresh vigour during the whole period of Edward Forbes's medical noviciate.

In concluding this prolonged sketch, I would dwell emphatically on two points—1*st*, The great scientific revolution which in less than thirty years has come over the medical studies of Edinburgh, was not owing to Edinburgh having been behind the other medical schools of the country twenty-five years ago. On the other hand, I am not afraid to say, that no British school had precedence of her in either the science or the practice of Medicine. 2*d*, This revolution proceeded at Edinburgh with a silent, unobserved, continuous rapidity, because the old did not hinder it, and the young did not precipitate it.

There was abundance of rivalry, and no want of the *odium medicum;* but the scientific strifes and profes-

sional rivalries were almost entirely between peers and equals, not between seniors and juniors. The seniors often furnished little encouragement, and the juniors often presumed too much, but both gave and took, and they succeeded in striking a happy mean.

Nearly all the present Professors of Medicine in Edinburgh were the favourite pupils or former assistants of their predecessors, or of their senior professors. In this relation Edward Forbes stood to Professor Jameson; John Goodsir to Professor Monro; Professor Balfour to Professor Graham; Dr. Simpson to Professor Thomson; the present writer to Professor Christison. To this friendly co-operation between the enthusiastic, speculative younger men, and their more cautious, critical seniors, is greatly owing the unbroken and silent progress which Physical Science underwent in Edinburgh within quarter of a century. It was fortunate for Edward Forbes that he entered its University when the unceasing Athenian longing "for something new" was about, like a green perennial, to show the fulness of its vitality by bursting into flower.



CHAPTER V.

A YEAR OF STUDENT LIFE IN EDINBURGH.

THE Medical School of Edinburgh, of which Edward Forbes now became a pupil, consisted of two dissimilar, and, in some respects, antagonistic bodies. The one of these was the University, more especially as represented by the Professors who constituted its Medical Faculty. The other, constituting as a whole the extra-academical Medical School of the city, was composed of Fellows of the Royal College of Surgeons and of the College of Physicians, who availed themselves of a privilege of Fellowship which entitled them to lecture publicly on any branch of Medicine.[1]

Avoiding all details which do not bear upon our subject, it must be noticed that to the University belonged the privilege of conferring the degree of Doctor of Medicine, and of educating for that degree; besides

[1] In addition to Fellows of the Colleges, properly qualified persons, not members of the medical profession, were allowed to lecture to students of Medicine on Natural Philosophy, and a similar privilege was afterwards conceded to lecturers on Chemistry. As the first teacher of Chemistry who profited by this concession, I owe a debt of gratitude to the Royal College of Surgeons of Edinburgh, which, even in passing, I am bound heartily to acknowledge. This concession implied, on their part, losing the comparatively large fees which otherwise a chemist would have paid them to obtain, as Fellow, the right to lecture, whilst in addition they conferred on him the right to receive fees from students, and accepted his tickets and certificates as entitling their bearers to examination for the diploma of the College.

the right of educating for the title of Surgeon, which, however, it could not confer. The College of Surgeons, on the other hand, possessed the privilege of conferring the diploma of Surgeon, and the extra-academical school mainly supplied the instruction required by candidates for that title. The University was thus a school for physicians; the extra-academical lecture-rooms a school for surgeons. For Edward Forbes, who wished a physician's degree, attendance on the University was imperative; but as he did not desire a surgeon's diploma, it was not incumbent on him to attend any class beyond the College walls. Like most students of his time, however, he attended many of them.

The title "Extra-Academical Medical School," did not imply any association or corporation of united lecturers. It was merely a collective term for all the teachers of Medicine who were not professors, and whose lectures did not qualify for the University medical degree. In one respect the extra-academical teachers were rivals of the University, which shared their privilege of educating for the College of Surgeons' diploma, without dividing with them the right of educating for the University medical degree. In another respect they were rivals of each other, for there was no limit to the number of teachers, except that furnished by the Fellows of the Colleges, so that on each branch of medical science there were generally two lecturers; on the more important branches—as Anatomy, Chemistry, and Surgery—three; on the last, sometimes four. The explanation of this lay mainly in the fact, that for a multitude of professional purposes a surgical diploma was sufficient, and for

most public medical appointments was essential, whilst a physician's degree was not.

In 1831, accordingly, when the number of medical schools throughout the country was very much smaller than it is now, the Edinburgh Extra-Academical School was large and flourishing. Men of great, though various, ability were teaching the several medical sciences. On a single subject the student had his choice of two, three, or four lecturers; and on subjects such as Anatomy and Surgery, where prolonged attendance was required, nearly every pupil enrolled himself in successive years under different teachers. Edward Forbes followed the general example. No letters of this date have reached me, but the note-book already referred to as chronicling his first London journey, contains an obscurely dated cash-account of his expenses during his first year in Edinburgh, which is sufficiently precise on the matter before us. In the second week of November, he takes out Dr. Knox's extra-academical class of Anatomy, and within the University, Dr. Hope's class of Chemistry, and Dr. Duncan's class of Materia Medica. One significant entry sums up these doings:—

COLLEGE AND PROFESSIONAL.

Matriculation Fee,	£0	10	0
Museum Fee,	1	1	0
Dr. Knox's Lectures,	3	5	0
,, Practical An.,	3	5	0
Dr. Hope's Chemistry Class,	4	8	0
Dr. Knox's text-books,	1	10	0
Dr. Duncan's Materia Medica,	4	8	6
Dr. Duncan's text-book,	0	16	0
Dr. Hope's ditto,	0	18	0
	£20	0	6[1]

[1] The error in the summation occurs in the original note-book, and is eminently characteristic of Forbes's arithmetic.

From this and similar entries it appears that, like most medical students, he devoted the first winter to Anatomy and Chemistry, and that, unlike most, he attended also Materia Medica, from which he could not possibly profit at that stage of his studies, besides taking out the ticket of admission to the Natural History Museum, a proceeding which speaks for itself. Of his studies in the Materia Medica I know nothing; but it is certain that he devoted himself with great zeal to Anatomy and Chemistry; and that he made abundant and most profitable use of the Museum ticket does not demand formal proof. Medicine as a profession he by and by abjured; but even if his devotion to Zoology had not made Anatomy a welcome study, he could not have failed to listen with delight to such prelections as the eloquent Dr. Knox was at this time delivering to a crowded circle of delighted hearers. Long after, when his old teacher had paid the penalty which his sneering, satirical, Ishmaelitish spirit had long been provoking, Edward Forbes reluctantly pointed out, that the neglect and obscurity into which he had fallen were the fruits of his own, not of others' misdoings. But no one would have been more forward than he to acknowledge that, with all his faults, Dr. Knox was a man of genius, the subtlety, suggestiveness, and ingenuity of whose anatomical and physiological speculations were peculiarly fitted to attract and fix the attention of students whose intellectual sympathies were large and free. To Edward himself, moreover, the daring wit and humour, and the unsparing satire of the lecturer, were additional causes of interest in him. We cannot wonder then, that not

content with attending the lectures of Dr. Knox, which were enough in the way of Anatomy for a beginner, he also joined his practical class, which implied the direct handling of the dead body in the dissecting-room.

Chemistry could not fail to be interesting to one who was an eager student of mineralogy. In after life Edward Forbes did not receive credit for the interest he took in this science. But it is quite certain that it delighted him from the first, and the number of chemists whom he counted among his most intimate friends showed that the interest remained to the last. In recurring to his student days, he repeatedly mentioned to Mrs. Forbes, who was my informant on the matter, that few things had vexed him more than his absence, through indisposition, from Dr. Hope's class on a day when the roll was called. He was marked absent, and nothing would induce the Professor, who was by no means accommodating to students, to qualify the entry. To a friend[1] also, who has recorded the fact, he mentioned that "he had gone through a practical course of Chemistry with a fellow-student, employing apparatus bought with their common funds. At the conclusion he hesitated whether to take up Chemistry or Natural History as his prominent pursuit, and, agreeing to refer the matter to chance, they 'tossed up' for the apparatus, and the adverse throw by which he lost the chemicals confirmed him in adhering to the latter science." His good genius certainly presided over this "toss up," for he never would have achieved in Chemistry what he effected in Natural

[1] *Fraser's Magazine*, January 1855; Art. "Edward Forbes." The writer of this pleasing sketch was, if I am not misinformed, his former colleague at the Museum of Economic Geology, Professor Warrington Smyth.

History, but the incident shows how loving a disciple of the former science he was.

In the studies thus named, the first winter passed away; but it will be convenient to trace them formally onwards to the close of the summer which completed the session, before considering the spirit in which they were pursued, and the fruits which they yielded.

Our chief guide in this inquiry is the "cash account" for the first nine months spent in Edinburgh, which is kept with great regularity, but with equal conciseness and brevity. As in London, we have neither year nor month; but the dates of the latter are given, and the initials of the days of the week. We are curiously helped also, in keeping the chronicle of the weeks square, by the Sunday always appearing as thus, "S. 4.—Church, £0 0 6," which signifies that on Sunday, 4th December 1831, Edward Forbes put, as they phrase it in Scotland, sixpence into the plate at the church-door, or as some may better understand it, contributed that sum to the offertory. Similar entries, varied only by the sum occasionally rising to a shilling, occur throughout the account, and mark how regular a church-goer the writer then was.

Following this guide, we find that on the 13th of December he joins the Physical Society. The next day he purchases a hammer and a botanical box. The day after he acquires certain "chemical instruments," and two days later his hand is again in his pocket to purchase "minerals." These outlays seem to have contented him for a time, but in January (1832) he returns to the purchase of minerals, "Jameson's Mineralogy," "chemi-

cals," and "instruments," which were probably chemical apparatus. In the middle of February (16th), we come again upon a purchase of instruments, but this time they were plainly anatomical dissective knives, for the next entry runs, "W. 17.—Leg, £2 0 0;" so that he has paid £2 for the lower limb of a subject, and we are to suppose him busy at intervals dissecting it, under the superintendence of Dr. Knox, whose rooms (now demolished) are in Surgeon Square. It does not, however, engross his attention, for on the 20th he purchases a "spood," or botanical spade, and on the 25th, "shells." In March he makes further purchases in minerals, acquires "painting materials," makes a journey to Roslin, and procures another botanical box. April witnesses additional outlay on shells, the purchase of a geological bag, and a journey to Peebles, which followed the close of the winter session.

May is fitly inaugurated by a dredging expedition, and thereafter he enters formally on the study of Natural History, as the following entry on the 9th of the month, which, it appears, was a Wednesday, shows:—

W. 9.—Graham,	£4	9	0
Jameson,	4	8	0
Books—Richard,	0	12	0
Hooker,	0	10	0
Reid,	3	3	0
	£13	2	0

He thus joined the University class of Botany under Professor Graham, and that of Natural History under Professor Jameson. The last entry doubtless refers to his attendance on Dr. D. B. Reid's class of Practical Chemistry, taught beyond the University halls. He pur-

chases, it will be observed, two text-books on Botany, but he has no occasion to purchase any on Natural History.

From this time the cash-account is kept less regularly, and it stops abruptly on the 1st June. The only entries of any interest are 1s. 7d. for a "dredge," and 2s. for "insects." Once for all, I may state that the ordinary references of this Journal are to household expenses, and the smaller charges of everyday life.

I have been thus minute because of no later year have we so full a record, imperfect though that given may be, and I am specially desirous that the reader should have the means of forming his own estimate of the character of Edward Forbes in his early years. We are not left, however, to interpret this from materials so inadequate as the meagre skeleton which the laconic cash-account supplies. The voices of friends who knew him in his student-days can clothe the skeleton for us, and make it a breathing, living thing. Let us listen to two of them. John Goodsir, the present distinguished Professor of Anatomy in the University of Edinburgh, who, in virtue of similarity of genius and of tastes, exerted a greater intellectual influence over Edward Forbes than any other of his associates, was the first friend he made in Edinburgh, as by a mournful coincidence he was the last to leave his death-bed, twenty-five years later.

Young Forbes, soon after his arrival in Edinburgh, found his way into Dr. Knox's dissecting-room. The usual crowd of students who haunted it were absent at lecture, hospital, or elsewhere, and the living were repre-

sented only by Mr. Goodsir, who was busy in a corner, as he tells me, dissecting a "head." The tall stranger walked up to him; they soon got into earnest conversation, and found that they had many tastes in common. The fascination which Forbes exerted over all he came across did not fail on this occasion, and within a few days Mr. Goodsir visited his new friend at his lodgings. He had lost no time in exploring the neighbourhood. Round the room were scattered the novel plants and animals he had already encountered. The ledges of the wainscot were covered with minerals, which could not be accommodated on the table, littered as it was with MSS. and note-books. He had already climbed Arthur's Seat, and been delighted by finding a kind of snail new to him; specimens of this were before him, which, with a view to study their structure, he had *boiled*, the notion of dissecting a raw snail being quite strange to him. Mr. Goodsir interposed, advised the omission of boiling, and gave the future great malacologist his first lesson in dissecting mollusca. This tribe of animals, known to

[1] I have often heard Forbes, who loved a joke against himself, laughingly refer to the episode of the boiled snails; but it marked an era in his knowledge as he showed in many ways. The Rev. H. Wardrop, who attended his lectures at Edinburgh in 1854, tells me that when he took his class to Arthur Seat in May of that year, he directed their special attention to the snail in question, which belongs to the genus *Clausilia*. Dr. Spencer Cobbold, who also heard these lectures, adds that Forbes frequently drew the outline of its shell on the black board before the class, as if it were a favourite with him. The particular species found on Arthur's Seat is, I believe, *Clausilia nigricans*. It is scarcely half an inch in length, spindle-shaped and spiral, with some ten whorls. The name of the genus is taken from the *clausium* or valve which occupies the mouth or throat of the shell.

The characters of this genus of mollusca are thus described by Messrs. Forbes and Hanley:—"*Clausilia*—shell spiral, produced elongato-fusiform, almost always semirostral; aperture elliptic or pear-shaped, always toothed and closed in its throat by a testaceous, elastic, folded lamellar valve or clausium....

"The shells of this genus are equally remarkable for the peculiarities of their shape, and for the curious opercular valve of their apertures. The majority of species are centralized in south-eastern

naturalists as the pulmoniferous or lung-bearing mollusca, were as great favourites with him as their congeners the *lungless* sea slugs and molluscs on which he laboured so much. A few years later he communicated to the British Association a report on their distribution in Europe,[1] and the next year another still more elaborate report on their range through the British Islands.[2] The lesson in snail-dissecting, accordingly, we may be sure, had a growing significance for Edward Forbes as the years went on, and he became one of the greatest authorities regarding mollusca. He seems, as I have indicated in a note, to have entertained a peculiar regard for the clausilia, which thousands have climbed Arthur's Seat without discovering, and most of whom, had it been put in their hands, would have flung it away as an insignificant periwinkle.

If, however, Edward Forbes was delighted to find in the grave, gentle friend he had made, a self-taught, widely-accomplished, comparative anatomist, John Goodsir was not less struck with the genius and accomplishments of the self-taught naturalist, who had so frankly sought his acquaintance. Referring to this interview and the friendship which followed, Mr. Goodsir says—"When beginning his studies in Edinburgh in 1831, Mr. Forbes had already made great advances in his favourite scientific pursuits, and to these attainments he added remarkable artistic powers, and literary acquirements of an extraordinary extent in one so young. He was pre-eminently a naturalist. His attention had

Europe."—*A History of British Mollusca and their Shells*, by Professor Edward Forbes and Sylvanus Hanley, B.A., vol. iv. p. 116.

[1] *Report Brit. Assoc.* for 1838, sect. p. 112.

[2] *Report Brit. Assoc.* for 1839. P. 127.

never been exclusively directed to any one of the natural sciences. He was equally a botanist, a zoologist, and a geologist from first to last."[1]

Another friend, the Rev. Dr. Campbell, now Principal of the University of Aberdeen, who made his acquaintance at the Botanical Classroom, has kindly sent me the accompanying sketch :—

"I have a vivid remembrance of the occasion on which Edward Forbes first fixed my attention. Dr. Graham, the Professor of Botany, whose class we attended during the summer of 1832, was in the practice of marking by numbers, certain of the British plants in the garden, and requiring the students to discover and report to him their names. When standing one day after lecture with some class-fellows over a plant thus marked, none of us being able to assign its name, I heard a voice call out over my shoulder, 'Oh! that is *Eupatoriub Caddabidub*' [*Eupatorium Cannabinum*]. Our surviving fellow-students will at once recognise by the peculiar pronunciation and the ready answer, that the speaker was Forbes. At that time he always spoke as one does when the nose, as the phrase is, is stuffed with cold; and this peculiarity, although greatly modified by time, was never, I think, entirely got rid of.

"On turning round I saw a student, a year or two my junior in age, clad in an olive-coloured surtout, whose tall, slightly-stooping figure, pale and somewhat sallow complexion, and kindly, intelligent eye, had sometimes arrested a passing glance in the class-room. We entered

[1] *Scotsman* newspaper, Nov. 22, 1854. *Annals and Magazine of Natural History*, January 1855, p. 51.

into conversation. I was greatly astonished at the extent and variety of the studies of so young a man in Natural History; and when I found that his attainments had been the result of solitary investigation, under the sole impulse of native genius and love of science, I at once felt confident of his future eminence.

"Our acquaintance grew steadily. I remember well my first visit to his lodgings. I found him surrounded by objects from all the realms of nature; minerals and rock-specimens; algæ and shells; seeds undergoing all kinds of treatment; snails decapitated, yet living in the hope of sprouting forth new heads; and a frog or two patiently ministering in some other way to the progress of science; while on the table at which he sat, amid specimens of dried plants, lay manuscripts, landscapes, portraits of natural objects, and caricatures, in pencil, in ink, in sepia, in water-colours (besides one or two in oil against the wall), a geological map and sections of his native island, and a boyish travesty of the opening of the Iliad, with reference to the Reform Bill, in which the political leaders of the time figured in the places of the Greek chieftains. Of this, when I entered the room, I think he had been engaged in making a corrected copy, of which he read me a portion with great self-complacent emphasis; but other matters calling for our attention, he handed me the rough draught of the first hundred lines, which I still find among my papers. The spirit of this performance was, like its author at the time, intensely Tory. As in my own case, and that of many of our contemporaries, the indiscriminate abuse, the vulgar appeals to popular passion, the coarse contempt of men and

things identified in our minds with all the greatness of our country, amid which the Reform Bill had been carried, had aroused in him a loathing dislike, a dread lest all that was truly great and ennobling in literature and science should be swept away by a barbarian irruption of low utilitarianism. He never lost temper or gave offence; but he never omitted an opportunity of expressing his political sentiments. He smiled when, in Jermyn Street, in 1851, after a separation of eighteen years, I said that the Reform Bill had not stopped *his* advance in science or in fame.

"When I became acquainted with him, Forbes, although only eighteen years of age, had already acquired a clear, systematic knowledge of Natural History in all its branches, which was truly extraordinary. His powers of abstraction and generalization, and of perceiving the connexion between apparently isolated facts in remote departments of nature, and widely separated regions of the world, were astonishing in one so young. Every new object he took up as an old acquaintance, and although it was plainly impossible that he could have seen the object before, he rarely hesitated in naming correctly what he saw, and never in assigning it its place in the system. Notwithstanding the confused and desultory manner in which he appeared to pursue his studies, and even to arrange his collections, every phenomenon and object ranged itself in its due order in the cabinet of his mind. In new, and to him untrodden paths by sea and by land, in mines and on mountain tops, he appeared always to know what was to be found. He possessed an advantage, which it is impossible to overrate, in his

wonderful talent for drawing with rapidity, accuracy, and spirit, and with any materials, although always with the happiest selection from the materials within his reach, any object or scene which presented itself.

"His humour showed best in the exercise of his pencil, in which he might have disputed the palm with Bewick. He was not witty in conversation, but would at times break out into boyish hilarity and uproarious fun, in which he would bawl out broadly comic and grotesque verses of his own composition, without a particle of tune, but with as great self-complacency as if he were discoursing most eloquent music. His innocent, guileless heart, in the intervals of deep thought, often came gushing forth in a stream of high spirits.

"His general reading was far more varied and extensive than might be supposed, considering his amazing progress in science. He understood and remembered what he had read at school of the classics. His criticisms on poetry were often strikingly correct. Sometimes, although very rarely, he fell for a short time into a sentimental mood.

"His chief moral excellencies were great candour and reasonableness, great gentleness and love of peace. He sought peace and ensued it, partly perhaps from constitutional timidity and caution. He abhorred dissensions. He put the best construction on all the words and deeds of others. He seldom or never complained of others, or found fault. A maxim often on his lips during our intercourse was, 'Let every man do his own way, as long as he does no harm to others.' He was totally devoid of envy, jealousy, malice, or anger. Without

being actively benevolent, or indifferent to his own comfort and success, yet no man could rejoice with a purer joy than he did in the discoveries and in the growing fame and prosperity of others."

We are now in a condition to picture to ourselves how Edward Forbes spent his first academic year. He lodged at 6 Howe Street, one of the steep streets on the north side of the New Town, leading towards the sea. This lodging was conveniently situated half-way between his favourite haunts, the Natural History Museum and the Botanic Garden; Arthur Seat, and the sea. A liberal allowance from his father gave him command over all the requisites for study, and after a fashion of his own he was unsystematically economical.[1] During the winter months the forenoon was spent in attending lectures on Anatomy, Chemistry, and Materia Medica; the afternoon in studying the specimens in the Museums of the University and the College of Surgeons; in reading in the Library of the University; but perhaps chiefly in Dr. Knox's dissecting rooms. In summer, Botany, Natural History, and Practical Chemistry, took the place of the classes named above. The Saturdays, all through the year, were largely devoted to country strolls, and as the season went on, to lengthened botanical excursions, insect hunting, field geology, and dredgings in the Firth of Forth. He was better provided with introductions to families in Edinburgh, than most stranger students are, and as he became a favourite, without fail, in every circle to which he was introduced, he could always

[1] This allowance amounted to about £120 per annum, a sum more than amply sufficient for the wants of an Edinburgh student.

secure relaxation in the evenings. Fond of society, he availed himself frequently of this privilege, and his love for dramatic representation took him occasionally to the Theatre; but the great amount of work which he did during his first session, is sufficient proof that the great majority of his evenings were spent in study at home. We have already seen how regularly he attended church.

Thus far our sketch is a mere generality which would apply with little alteration to any well-disposed medical student. The peculiarity in Forbes's case lay in the wide and diversified field of study over which he ranged; in the almost exclusive preference which he showed to the scientific, and especially the naturalistic, over the professional branches of medicine; and in the unusual amount of acquisition in Natural History Science, and trained power of original investigation which characterized him even at the threshold of his medical novitiate. The proofs of this are abundant. It costs the ablest beginner a strenuous effort to follow with intellectual profit such a curriculum of study as Forbes was now pursuing. At a later period, no doubt, he deliberately neglected medicine, but I have the authority of Professor Goodsir for stating that at this time he was a zealous and delighted student of Anatomy, and it is needless to adduce evidence of his devotion to such subjects as Chemistry and Botany, which he was professedly investigating on account of their medical, not their intrinsic interest. I except Materia Medica, which, implying the application of Anatomy, Chemistry, Botany, Physiology, Practice of Physic, Surgery, and much else, to the maintenance of health and the cure of disease, could not be appreciated

or in many respects understood by the most intelligent medical novice. It was a mistake on Forbes's part to take out such a class in his first year, but such a mistake as a beginner readily makes. He gave the subject, however, a certain amount of attention, if it were no more than his bodily presence for some five hours each week in the lecture-room, so that he burdened himself with a class more than most first-year students of medicine attend. Here, then, was seemingly work enough, but it did not content the energy of Forbes.

Among the MSS. which Mr. Goodsir saw crowding the table of his lodgings, lay open what he described to me as "a long foolscap note-book." I have it now before me. It is marked on the board—"*Edwardus Forbes, Medicinæ Naturæque Studiosus in Academia Regia Edinburgena Alumnus, Societatis Regiæ Physicæ Socius, etc. etc.* 1831,"[1] and is surmounted by the writer's beloved three-legged symbol of his native land. On the first page it is entitled, "*Place-book from Novemb.* 1831 *to Novemb.* 1835." It contains some references as late as 1843, but the great majority are within the dates given, and as the years in question include those formally devoted by Edward Forbes to medicine, its contents throw much light on his occupations during his medical studies. The book under notice is a narrow foolscap volume containing 180 pages, of which the greater part refers to 1831-33. It is partly a Commonplace Book

[1] I quote this title for the emphatic "Naturæque," showing his preliminary repudiation of the mere title of "student of medicine," and because the reference to the Physical Society appears to show that the book was commenced in Edinburgh. Some friend has improved the *Latin*, replacing a scored-out word—apparently *studentens* (?)—by "studiosus," and adding after an altered vowel, the word "alumnus."

for unannotated extracts, partly a record of original observations, partly a depository of criticisms on the writings of others, partly a series of memoranda of things proposed to be done. There are many drawings of Natural History objects, some of them coloured, and a few fanciful sketches, but the last are less abundant than in others of his note-books. The general impression conveyed by a glance through the work is that its writer was a person of great diligence, and very desultory tastes, much given to literature and to Natural History, but not particularly interested in medicine. It is difficult to be certain about dates in the case of one so inveterately negligent in chronology as our author was, but a reference to the contents and the first six pages of the book, which certainly belong to the close of 1831, and the earlier part of 1832, will throw some light on his favourite studies.

Resolved from the first to study literature and science side by side, he has begun by ruling his pages down the middle, and heading the left half-page or column, "Literary," and the right "Scientific." The date on the first page is "December 1831." He gives up the double column by and by, but to the end he keeps alternating literary and scientific references. The earlier ones are all extracts, varying from sentences or stanzas, to paragraphs and entire poems. In literature we find, in the matter of poetry, pieces from Byron's Manfred; Hogg's Queen Hynde; Stanzas to Music (from "*Blackwood*"); Thomson's Seasons; Spenser's Faëry Queen (many extracts); Wordsworth's Excursion (many extracts); Hindoo Poetry (translated in Quart. Review, 1831); Shakspere (chiefly

from Midsummer Night's Dream); Crabbe's Tales of the Hall; Southey's Curse of Kehama; Swift on Poetry; Atherstone's Fall of Nineveh; Zachary Boyd's Bible (this extract is not in Forbes's handwriting); Butler's Hudibras; Molière's Malade Imaginaire (Examination of Candidate for Bachelorship of Physic);[1] Cowper's Conversation and Task; Coleridge's Christabel, Genevieve, Ancient Mariner, etc.; Pope's Essay on Man; Joseph Warton's Ode to Fancy; Ben Jonson; Anacreon (in the original, and as translated by Cowley); Dryden's Cymon and Iphigenia; Waller's Amoret; Campbell's Muse of Painting; Shelley; James Montgomery; Collins' Ode to Liberty; Gray. The poetical readings thus referred to are in full accordance with those we have already seen him pursuing in the Isle of Man. Among his papers, also, I find a small separate volume entitled, "Book I. of Homer's Iliad, translated into English Verse by Edward Forbes, 1831."

In prose literature we have extracts from Schlegel's Lectures; Fleming's Philosophy of Zoology; Buffon's Natural History; Dr. Chalmers; Suetonius; an Essay on Universal Redemption; Abercrombie's Intellectual Powers (many extracts), side by side with which are quotations as numerous from Paris's Treatise on Diet; Phillips' Lectures on Painting; Combe's Phrenology; Spurzheim's Phrenology; Lord Jeffrey's Theory of Beauty (?); Hooke; Shaftesbury's Characteristics (many extracts); Dr. Mason Good's Errors in the Translation of the Bible, in Life by Dr. O. Gregory; Payne Knight's

[1] An extract occurs here, dated 1833, but it appears to be an interpolation on a page purposely left blank. It is possible, however, that the later extracts belong to 1833.

Principles of Taste; Burke on the Sublime and Beautiful; Hutcheson as quoted by Burke; Xenophon's Memorabilia of Socrates (translated); Enfield's History of Philosophy.

In the scientific column are quotations from Ure's Geology; Cuvier's Lectures; Captain Irby and other writers on the "Mustard Tree of Scripture;" Smith's Introduction to Botany; a list of writers on Marine Phosphorescence and Animal Electricity; a list of writers on the Deluge, etc., taken from Jameson's Journal; Dr. W. Gregory's Analysis of Dead Sea Water; Brongniart on the Primæval Vegetation; Sprengel and Decandolle's Philosophy of Plants; Wilford on Hindoo Doctrine of Deluge of Deucalion; Dimensions of Manx Fossil Elk, *Cervus megaceros* (perhaps taken from his own measurements of the specimen in the Edinburgh Natural History Museum, which he figures in another part of the book along with the specimen belonging to the Royal Dublin Society); R. C. Taylor on British Fossil Shells; Bowditch on Memory and Instinct in Animals; Article in Phil. Mag. on Living Fibres (this extract is dated 1833); Gordon on Analogy between Structure and Functions of Plants and Animals.

After this comes, all under date 1831, "a List of the Esculent Fungi found in Great Britain, from Dr. Greville's Paper in the Wernerian Society's Transactions;" a "Systema Naturæ," illustrated and seemingly original; "Notes on Comparative Anatomy, from Cuvier's Lectures." Besides these are several entries out of order, but dated 1831 or 1832, such as, under the former year, a whole page occupied by a copy (from Mr. Combe's work)

of a head, with the phrenological organs marked on it, and a numbered list of their names. This supplies the materials for a very curious estimate by Forbes of his own character, drawn up in 1835.

It is needless to repeat that the extracts given are proofs of great though desultory diligence. They are not more numerous or more diversified than such as would be found in the note-books of many a clever literary student, but in judging of them it must be remembered that Forbes was the opposite of a literary or scientific recluse. He had nothing in him of the *Heluo Librorum*. Books were useful to him, but not indispensable to his comfort. He was impatient of confinement and protracted reading. When alone within doors, a Natural History specimen, a pencil, or a microscope was as often in his hand as a book, whether professedly working or resting. Out of doors his happiest days were spent in botanizing, geologizing, dredging, or sketching. When the season of the year or the weather rendered these occupations impossible, museums, picture-galleries, meetings of scientific societies, public exhibitions, dramatic representations, concerts, and social parties had great attractions for him; and verse-making was a favourite occupation at all times and places. It is marvellous, accordingly, that even in his first medical session, when he was more a recluse than in later years, he should have read so much in works lying, many of them, outside the circle of his formal professional studies. It would excite no surprise to find a richer Commonplace Book in the hands of a student of law or theology, but few naturalists, and still fewer students of medicine, would

be found quoting in their memoranda such works as Forbes delighted to peruse.

With all his catholicity of intellectual taste, however, he did not take kindly to the purely medical departments of medicine. The evidence of the Note Book on this point is solely negative, and had we only it to guide us, we could not safely draw any very decided conclusion. Nevertheless its silence is significant; for the Note Book, in common with the multitudinous others kept by its author, was, after a few pages had been consecrated to a special purpose, practically regarded as a desk full of pigeon-holes, into one of which was thrust whatever thought of others or his own, written or reducible to writing, happened to interest him. We hunt in vain, however, through the deposits of some four years for any reference to medicine more precise than such extracts from Paris on Diet, as:—"Wedder mutton perfect at five years; ewe mutton best at two years. . . . Sydenham always took a glass of small-beer at his meals, and he considered it as a preservative against gravel." On the other hand, if we dive at random into the book, we find lengthened and elaborate abstracts of papers on Natural History, occupying many of them a number of pages, and not a few illustrated by a long series of drawings. Such are some conchological anomalies, noticed by Gray; European Diptera, by Meyer, with pen-and-ink drawings of the typical insects; Carl Pfeiffer's "Land-und-Wasser Schnecken," with numerous coloured drawings of the more interesting shells; "A view of the Classification of Molluscous Animals, by Baron Cuvier;" "Materials towards a Conchology of the Irish Seas," with

extracts from papers by Broderip and Sowerby; "Succession of Secondary Rocks, from Cuvier's Essay," with two pages of illustrative drawings; "Leach's Arrangement of the Cirrhipedes;" "Additions to the British Fauna," from various authorities, etc. etc. etc.

In making these full extracts or quotations he was only carrying out a scheme begun long before. One of them (dated 1831) is entitled, "Notes on British Botany from the English Flora, forming an appendix to my Nat. Hist., Div. British Botany."

The "Natural History" thus referred to is a small MS. quarto, marked on the fly-leaf "Vol. 1. Compiled and Transcribed during the years 1828-1829, 30-31." It was thus begun in the Isle of Man when he was thirteen, and probably completed in Edinburgh when he was sixteen. It consists of above a hundred pages, and is divided into six sections :—

I. Botany according to the Linnæan System.
II. Mineralogy according to Professors Mohs and Jameson.
III. Geognosy according to [authority not given].
IV. Organic Remains according to Linnæus, Cuvier, Parkinson, etc., with an Appendix containing a Table of British Fossil Shells, from Parkinson, with additions.
V. Conchology according to Fleming.
VI. Zoophytes.

These sections are drawn up in the form of tabulated columns, with headings and detailed indices. The Botanical Section is the fullest, and to judge from the boyish handwriting, as well as from its place, it is the earliest, but the book has in part at least been written on separate leaves, afterwards bound together, and these may be of different dates. This division is largely illustrated by coloured drawings of a very rude sort, but with

wonderful character about them, and unmistakable as likenesses of the plants they depict. The British fossil shells are also illustrated by graphic pen-and-ink sketches, and the book otherwise is remarkable, like that just described, for the total absence of those fanciful designs with which the compiler generally covered the margins, and sometimes filled the pages, of his MS. volumes.

The absence of such pictorial fancies, the careful classification, and the elaborate indices, all show that the book was not compiled as a pastime, still less as a task. It was plainly intended for use, and must have been a work of great labour and patience, which only conviction of its utility could have induced an indulged boy to begin, and an eager youth to finish. Edward Forbes, indeed, brought to Edinburgh a much greater stock of learning in Natural History than the great majority of its medical graduates, after four years' study at its University, carry away with them.

Nor, as implied already, was it only, or even chiefly, book learning in Science that he brought to Edinburgh. The faithfulness of his roughest portraits of plants and shells, the naturalness of his colouring, and the rapidity with which he pounced upon the novelties of a strange Flora and Fauna, show how effectual his unmethodical Manx self-culture had been in training his eye and hand to exact observation and execution. His note-book contains an alphabetical list of the Land and Freshwater Shells around Edinburgh, dated at the close, 1833. But many of the materials were gathered in 1832, beginning with the Clausilia in 1831. In this list he gives the habitat of the animals, and those which are noted on his

own authority show how widely he had traversed the district, and made himself familiar with its Fauna. It was impossible that in a year so largely devoted to the acquisition of knowledge, he could give many proofs of his powers as an original thinker. Within about a month, however, of joining (Jan. 24, 1832) the Physical Society, he read a "Notice of Experiments on Animals of the genus Lymnea," which is embodied in full in the "Place Book." One of the species of this genus of freshwater shells, *Lymnea putris*, "abounds," as he states, "in the ditches and pools around Edinburgh." A paper which he heard read at a meeting of the Society, led him the day after becoming a member (Dec. 14, 1831), to experiment upon it, and he details in his own communication a series of sagacious observations on the effect of water, of carbonic acid, and of exclusion of air on the vitality of these creatures.

This notice is remarkable for a simplicity and conciseness of style, rare in authors of eighteen. Logical precision pervades it, and it ends with the modest commentary that "the foregoing experiments are simple, and of no great importance."

A far stronger proof, however, of his original power is to be found in the character of the books which he studied, as read in the light of his subsequent Researches. He was at this time, as was said of Sir Walter Scott, when gathering his Border Ballads, "making himself;" and his abounding references to plants and to shells were plainly the early gropings in the dark, and instinctive glimpses of the quarter whence light would dawn, which by and by led to his deliberate and authoritative

statements on the Geographical Distribution of Plants, and the laws which determine the development of life in the abysses of the sea.

In such occupations, Edward Forbes spent the first year of his student life in Edinburgh. To him it was not as to Tennyson, "the grey metropolis of the North," but a city which recalled the pictures of Turner and Claude. When, twenty-five years later, on the threshold of his brief Professorial life in Edinburgh, he reviewed his student days, he exalted that city as a great school for naturalists, not only because of its teachers, but because of its University Museum, the rich Flora and Fauna of its neighbourhood, and "the scenes of unrivalled beauty" amidst which it was placed. In his Inaugural Lecture, after commenting on "the untiring energy, watchfulness, earnestness, and devotion to science, of" Professor Jameson, as shown in the "admirable and extensive collection of specimens" which he had collected, he continues:—"But here we have not only an excellent Museum at hand; there is a still greater one all around us. If any one spot on earth is peculiarly adapted for the study of Natural History it is this—the district in whose centre we are now assembled. Everywhere about us are abundant and admirable illustrations of Zoology, Botany, and Geology. Of its excellent and well-explored Flora, I leave my eminent colleague and old friend, the Professor of Botany, to speak. Amid the rich materials of its Fauna I learned some of my earliest and best zoological lessons. To dredge the Firth of Forth under the guidance of shrewd, strong-handed, and strong-armed Newhaven fishermen, was an early ambition of mine, and one

never too often gratified. I know the riches of the living treasures that lie in its submarine deeps, and along its shores; and though, since the time I ventured to print notices of these embryo efforts, I have explored most parts of the British Isles, and our seas far out, and foreign seas and estuaries, famous for their productions, I have not found any marine region with a population more varied within its limits, and better fitted to illustrate effectively the subjects of a naturalist's studies. Even on land and in the air there is an ample supply of species, quite enough to furnish the student with abundant means of testing the systematic characters taught in the class-room.

"As to Geology, where can there be a better district for practising the student in field-observation? The leading phenomena of rock masses are brought almost to the door of our class-rooms. . . . . The variety and beauty of the mineral contents of the igneous rocks round Edinburgh have long been famous, and have imbued every geologist, who received his early training in this University, with a respect for mineralogical evidence, and a habit of readily perceiving and using mineral characters—a great advantage.

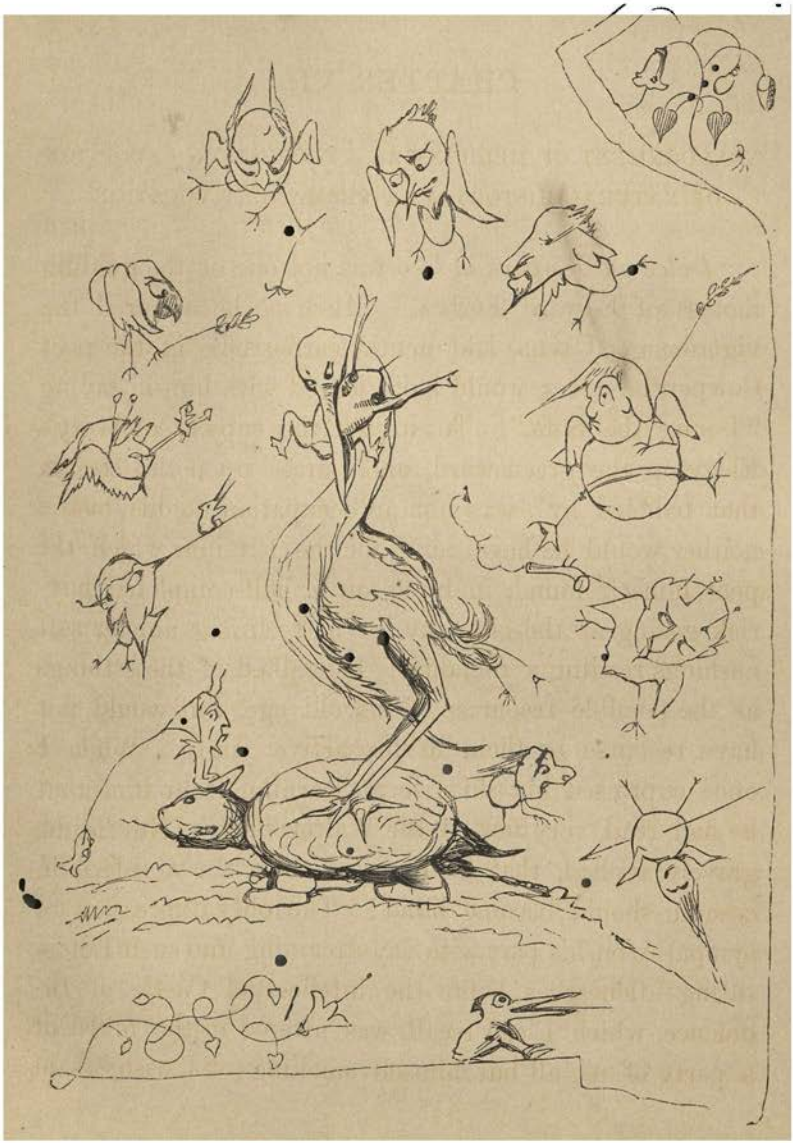
"The tastes of most men can be traced back to the habits of their youth, and these habits are, in a great measure, moulded by the circumstances, physical as well as intellectual, amid which that youth has been passed. Grand scenery suggests grand thoughts, and every ennobling thought elevates, not merely momentarily but permanently, the mind in which it flows. It is a great gain to a University to be placed like this amid scenes

of unrivalled beauty. The youth whose hours of relaxation are spent in the presence of these magnificent prospects, so rife and many around us, carries with him in after life the memory of their beauty and grandeur. . . . And if, with all this precious accumulation of the vast and beautiful, there be combined that which is admirable in the minute—if Nature in her smallest elements be prolific in objects of study and reflection, it is not to be wondered at that this University has been a hot-bed of naturalists, and that their philosophy has been one catholic in essence and far-extending in its range. . . ."[1]

So passed with Edward Forbes his first academic year, one of the happiest of his whole life. The dew of his youth was still upon him. The corrupting breath of the world had not tainted his freshness, or its cold touch chilled him. His eager eyes looked forth on a rich and boundless future. Young men of genius and tastes like his own had become his attached friends. Seniors of the highest repute welcomed him as a pupil. Libraries and museums of the greatest value were open to him daily. His shortest walks were through the streets of a city which delighted his artist eye, and had a strange fascination for him. His longer excursions carried him quickly into a district which was for him, to borrow a thought of his own, like the Garden of Eden to Adam, "a paradise filled with creatures yet to be named." The session fleeted rapidly away, and in

[1] Inaugural Lecture by Professor Edward Forbes, delivered May 15, 1854.—*Edinburgh Monthly Medical Journal*, June 1854.

the pleasant month of August, when Douglas Bay is calmest and clearest, he was welcomed back to the Isle of Man.



CHAPTER VI.

ABANDONMENT OF MEDICINE AS A PROFESSION—ADOPTION OF NATURAL HISTORY AS A PERMANENT VOCATION.

Dulce est desipere in loco was not one of the guiding mottos of Edward Forbes. Much as he admired the vigorous good sense and gentle earnestness of the poet Cowper, he never would have joined with him in saying "I sing the Sofa." To stretch the subject of Gray's Elegy on the greensward, and "muse upon the stream that babbled by" was not an occupation to his taste; neither would he have cared for the Elysium which the poet himself found, in lying on a half-completed hay-rick gazing at the blue sky, or in reclining among soft cushions reading a romance. He talked of these things as the possible resources of his old age, but would not have recourse to them in his active youth. When I once expressed my surprise at learning from him that he had read very few of Sir Walter Scott's Novels, he gravely replied, that he reserved them for a solace in case he should become blind! The only expression of sympathy on his part with day-dreaming and such Lotos-eating idleness as befits the intellectual Castle of Indolence, which I can recall, was uttered in the midst of a party of us, all but himself smoking: "I wish," said

he, "I could smoke, for smokers have such placid faces." If, however, he envied smokers, his envy was of a very innocent kind. He belonged to the class of energetic spirits, to whom, except when asleep, change of labour is more welcome as a recreation than absolute rest. So untiring indeed was the activity of his waking hours, that sleep often would not come when sought for, and it often happened, during his earlier student years, that nightmare dreams, of which he always spoke with great horror, revenged upon him his inordinate energy.

When he returned, accordingly, to the Isle of Man, he spent the three Autumn months of 1832 in diligent work. We do not hear anything of Anatomy or Chemistry, or of preparation for the prospective medical studies of the coming winter. Nor indeed is there a detailed record of any of his doings, but the entries in his note-book sufficiently show how hard he laboured at Natural History. He brought back from Edinburgh greatly enlarged views of Natural History, and a greatly increased acquaintance with its recorded facts. But the University served him most by teaching him the art of investigating the science which hitherto he had pursued in his own solitary, desultory way. The comparative anatomists furnished him with many a positive contrivance for revealing structure, besides the negative one of not boiling mollusca. He was initiated into all the devices of the botanists for discovering, dissecting, preserving, and cultivating rare plants. Professor Jameson, a great artist in mineralogy, communicated to him the methods which he had learned from Werner, and had

himself improved, for the examination of rocks and minerals, and from him, too, he had received practical lessons in geology, as it was studied in the open field by the fathers of the science.

Furnished thus with a knowledge of the means by which great naturalists had taught themselves and others how to observe Nature, he discovered new riches every day in the territory of Man.

There can be little doubt that already he had formed the resolution, referred to in a letter to the Rev. J. Cumming, to write a work on the entire Natural History of the Isle of Man, including some reference to its civil history, and a full account of its abounding antiquities.

In the end he partially carried out this intention. The *Malacologia Monensis*, a Catalogue of the Manx Mollusca, was published at Edinburgh in 1838. In 1848, he contributed to Mr. Cumming's work,[1] *Notes on the Flora of the Isle of Man*, and he supplied to the later editions of Quiggin's *Guide to the Isle of Man* a chapter on its Natural History, in which the Zoology, Entomology, Conchology, Botany, and Geology are successively treated, but all with great brevity.

The observations on which these communications were founded were continued for many years. They were begun, indeed, before he first visited London, and carried on at intervals till he returned to it, but they were not probably systematically commenced till 1832. Under that year I find explicit entries, to the extent of several pages, in reference to birds, shells, and insects, with a formal list of the first, and drawings of the two

[1] *Ante*, p. 2, note.

last. There is an undated Catalogue of *Manx Shells*, containing 196 names, followed by a similar list of *Manx Plants*, enumerating 383; and apparently unfinished lists of Crustacea, Arachnida, Radiata, etc. There are also under 1832, *Notes on the Geology of the Island*, written at some length, and including a reference to certain Manx antiquities.

He did not live to achieve a complete account of the Isle of Man, but the uncompleted investigations which he made in reference to its physical features, and especially his dredgings along its coasts, furnished the starting-point for some of the widest generalizations with which he enriched the whole science of Natural History. Thus the doctrine of Specific Centres of Distribution of Plants and Animals, if not suggested to him, was at least in his apprehension strikingly illustrated and confirmed by the characters of the Fauna and Flora of his native island, as compared with those of Great Britain and France on the one hand, and of Ireland on the other. To take an example which has long been of popular and even superstitious interest; the absence of poisonous reptiles from Ireland and from the Isle of Man, was explicable on the hypothesis that they originated on the Continent, and, spreading from their centre of birth there, reached England in the course of their western divergence, when Great Britain formed part of the now adjacent mainland. Before, however, they had travelled to Ireland or even to Man, these had become islands, and could no longer be reached. On the other hand, the Great Elk (*Cervus megaceros*), whose bones are found both in Ireland and Man, may be assumed to

have crossed from Europe to both at a time when the Irish Sea and the British Channel were occupied by land, which has since disappeared.

His doctrine, also, of zones of submarine life differing in character according to the depth of the sea in which they showed themselves, has been referred to by writers as first adopted by him in the Mediterranean, but it is quite certain that it had dawned upon him during these early dredgings along his native shores, and it was reduced to writing years before he visited the Ægean.

In November 1832, he returned to Edinburgh to enter on his second session of medical study, and a struggle began between the claims on his time of Natural History and Medicine, in which it is hardly necessary to say that the former prevailed. The struggle did not end till 1836, when medicine was formally and finally abandoned, and it will be convenient to trace the medical career of Edward Forbes onward to its close, after which we can uninterruptedly consider him in his true vocation of Naturalist.

The first year of medical study does not, as ordinarily pursued, overtask a student, or deprive him of a large amount of leisure; and, where his tastes incline him to devote that leisure to Natural History, there need be little confliction between his inclination and his duty. But the second year exacting as much anatomy from him as the first did, and requiring him to keep up his knowledge of chemistry, adds new studies, such as Surgery, Obstetrics, and Practice of Physic, which are far from congenial to the tastes of a naturalist. In con-

nexion with these classes, moreover, especially in the third and fourth years, come much minute dissection in the anatomical rooms, much attendance in the medical and surgical wards of the hospitals, many visitations to patients at their own houses, and to crown all, the constant revision of elementary knowledge, and careful preparation in every branch of medicine, which the final examinations necessitate, if they are to be passed with credit.

These duties occupy fully the time even of those whose love for the profession of Medicine makes all its demands upon them be easily discharged. But, as I can testify from experience, they form an irksome burden to such as only desire to make Medicine a door of entrance to the prosecution of the Physical Sciences.

Now, Edward Forbes had not the least relish for the practical duties of the surgeon or physician. He not only greatly disliked them, but he dreaded lest his formal investiture with the title of physician should be made a plea by his friends for his professional entrance on the practice of Medicine, which would have been fatal to his views as a naturalist. Nor were these objections counterbalanced by any considerations founded on the profession of medicine yielding an income. He had a patrimony, secure enough as it then seemed, and amply sufficient to supply all the wants of a student, and he clearly perceived that Natural History was as ready as the other sciences helpful to man, to acknowledge practically that "the labourer is worthy of his hire."

It would have been strange, accordingly, if he had been a zealous medical student; but when we further

consider that every day was opening up to him grander and grander views of the magnificent empire of natural science; and that, simultaneously, he was gathering about him a circle of young men of genial ways and diversified tastes, who unavoidably and often unintentionally tempted him to take part in their favourite, but to him alien pursuits, we shall not wonder that he was one of the idlest students of medicine Edinburgh ever saw.

In later years, especially when speculating on the future of his little son, he deprecated all compliments to himself as a model student, and it would be a mockery to offer any.

He was in truth altogether in a false position; most willing to work, and actually working hard, but set to labour at a calling for which he had the strongest aversion, whilst every facility was offered him for pursuing another which had been his passion since his childhood. Had he been pupil in a purely medical school, like those attached to the London Hospitals, where, at least in his student days, he would have found no distracting incentives to the study of Natural History, he might have put the latter altogether aside for a season, and devoted himself thoroughly to Medicine, though but as task-work, so as to have quickly done with it, and get back to his favourite studies. But in Edinburgh he felt towards Natural History like one who was torn from his first love, and, yet was compelled daily to meet her, and who had his attachment increased alike by the spectacle of her increasing beauty, and by the obstacles which prevented his devoting himself altogether to her. Even in London,

however, he would have been tempted to put off the evil day, and postpone the hour which signalled his admission into the ranks of physician. "Once a doctor, always a doctor," he felt to be practically as much the rule as is, according to ecclesiastical theory, "once a priest, always a priest." He was most reluctant, accordingly, to take the irrevocable vows, and doom himself to handle the lancet instead of the pencil or the microscope, and to lose interest in all mollusca except the medicinal leech. Nevertheless, prompted mainly by filial obedience, which was a prominent element in his character, he made a strenuous effort to become Doctor Forbes, and it seemed promising enough, as we have seen, in his first medical year. In this second year, however, it was plainly quite as much as he could do to keep the balance even between the claims of Natural History and Medicine. Before the close of the year the equipoise was sensibly disturbed, and in the wrong direction; Medicine, instead of preponderating, ceasing to counterbalance its rival, and plainly destined, if things did not alter, to kick the beam. During the succeeding years desperate efforts were made to adjust the balance, and even to turn the scale in favour of medicine, but they signally failed, and before we reach the spring of 1836, the medical scale-pan was as good as quite empty.

There is something serio-comic in the efforts which for a season Forbes thus made to continue the study of Medicine. He regularly attended the prescribed lectures, and none of the note-takers in the class used the pen more diligently than he. But his pen insensibly and swiftly changed from a writing into a drawing instru-

ment, and, instead of reporting the prelection, sketched, with a dash of caricature, the likeness of the Professor, or of one or more of the students, and then disported in pictorial fancies, showing how far away the thoughts of the artist were from the lecturer or the lecture.

I have before me whilst I write, a manuscript book nominally devoted to notes on Professor Turner's lectures on surgery, and Professor Alison's on the Institutes of Medicine. To the latter, however, only one page is assigned, and he possibly had a notebook to himself. The book otherwise is mainly pictorial. A scanty rivulet, as it were, of written notes, runs through the middle of certain of the pages at irregular intervals. The broad margins of these rivulets, besides the whole of the uninscribed leaves of the book, are occupied with pencil, or pen-and-ink drawings, which, without doubt, were made in the class-room.

Here and there are copies of the diagrams shown by the lecturer, such as the convulsed body of a sufferer from lock-jaw, a bandaged or ulcerated limb, or the branches of an important artery. Mingled with these, however, and quite overpowering them, are likenesses of professors, lecturers, and students; Dr. Knox, who appears in many attitudes, being the favourite subject of portraiture: sketches of shells, flowers, crystals, imitations of children's drawings, and fantastic, imaginary figures innumerable. Whimsically various though these drawings are, a certain medical tone prevails among them. A pedantic doctor flourishes a stethoscope. A grim anatomist "opens" a body in an unheard-of fashion. A sick man makes wry faces over a physic bottle. Skulls abound; skulls laughing, weeping, wearing spectacles,

looking wise, looking foolish, displaying every human passion. Skeletons are not less abundant, and in the most lively attitudes, gesticulating, dancing in couples, fencing, perambulating; more like living men and women who had adopted the Rev. Sidney Smith's recipe against very hot weather, and for coolness' sake had undressed to their bones, than the grim relics of the dead, at home only in the grave.

It might justly be urged in defence of Forbes, that Turner, as I can testify, was a most uninteresting lecturer,—a timid, shy man, who could not look his class in the face, and seemed fitted by Nature for anything rather than the duties and responsibilities of an operating surgeon. But it is needless to urge this plea, for even where the Professors were famous as teachers, they could not commend medicine to Forbes. Some portions of Dr. Alison's Lectures on Physiology must have thoroughly interested him, but, these excepted, he wandered from lecture-room to lecture-room in obedience to College rules which required his presence in them, without finding anything so welcome as his own day-dreams.

It was impossible, however, that a spirit so energetic as his could passively endure the tedium of such routine attendance on tiresome lectures, or be long content with warding off *ennui* by indulging his fancy. An almost unconscious reaction against the unintentional intellectual tyranny exerted over him by the lecturers on branches of medicine which he hated, led him to revenge himself upon them by caricatures which by and by were made public. Revenge is perhaps too strong a term,

for his nature was very kindly, and far from being disposed to hanker after vengeance. But I know no milder phrase which will express the fact, that the caricature likenesses he published of Edinburgh academic dignitaries were, in some sort, reprisals for the unprofitable waste of time which attendance on their prelections had occasioned him. It was not a step likely to win their favour towards him, and his consciousness of this increased his reluctance to come before them as examiners. I have adduced no proof of the truth of these conclusions, except the hieroglyphics of his note-book, but more direct testimony is easily furnished. The College companions who knew most about his medical studies were his future colleagues, Professors Goodsir and Bennett. Mr. Goodsir tells me that Edward Forbes knew more of medicine than is generally supposed, and that he could easily have mastered what little he did not know, but he did not wish to take a medical degree. Dr. Bennett states, in his Memoir, that during the period of his attending the medical classes in Edinburgh, Forbes "could never conquer his dislike to medicine as a profession. He was seldom seen in the dissecting-room or Infirmary. Even his attendance on the purely medical classes was of no great use to him, as he did little else than sketch the features of the Professor, or of the surrounding students."[1] Dr. Bennett adds, that in the session 1834-5, Forbes and three others "were associated in bringing out a weekly publication called the *University Maga*. It was illustrated by sketches of several prominent men about the College, executed

[1] *Edinburgh Monthly Medical Journal* for January 1855, p. 76.

by Forbes, and contains several of his poetical effusions."[1] We shall have more to say of the *Maga* again. It is referred to here simply as the publication in which, among others, certain of the prospective examiners of Forbes had their likenesses presented in a fashion not the most flattering.

But we learn most from his own letters. The earliest put at my disposal date from 1835. On December 3, 1835, he writes at length to his "father and mother." In the course of it he mentions:—"I am as well as I could wish, and at present am very busy with purely medical studies, anything but pleasant as you may suppose from my dislike of them; but followed up earnestly and exclusively at present, in order that it may not be said want of exertion should prevent my getting a degree here. As it is, I expect (if my health continues) to pass my first examination in the first week of May, and my second if possible in July; thus having the prospect of eight months' hard work before me. To enable me to do this I am obliged to 'grind,' as it is technically termed; that is, undergo a private examination with an authorized teacher or tutor, a ceremony now indispensable owing to the difficulty of passing, though rather expensive, as the charge is one pound six shillings a month. My hopes of getting through *here* rest wholly on this. This class, from ten to eleven, and another from two to three in the College (Pathology and Clinical Surgery), with the Hospital at twelve, are the sum of my occupations out of door at present." From a postscript it appears that the gentleman selected as

[1] *Edinburgh Monthly Medical Journal* for January 1855, p. 78.

private medical tutor was Dr. Seller, whose wide accomplishments are known to all. He began to attend him in November. At Christmas, he writes again at considerable length to his father and mother, especially in reference to the latter, who was suffering from an illness which soon after proved fatal. In the course of this letter he alludes more than once to his studies, as follows:—"I shall attend to your request of not visiting the fever wards, and will not put myself in the way of any infectious diseases, which I am happy to say are greatly diminished in the hospital of late. . . . I leave off my medical studies during the holiday week, and amuse myself with Natural History, etc., as a relief. . . . The University is on the *qui vive* at present, in consequence of the addition, during the last month, of the celebrated Sir Charles Bell to its list of Professors, as the successor of Professor Turner in the chair of surgery.

"*I expect to get through this year*—after which (and indeed independent of which) I have chalked out a line which I have every reason to believe will be attended with success, and which plan I may submit to you, in detail, in a future letter."[1]

On January 3, 1836, Edward Forbes had the great misfortune of losing his mother. Her death took away one strong motive for taking a medical degree. He knew that his elevation to the rank and title of physician would greatly please her, and he loved her too well to grudge struggling hard to give her this pleasure. But his father looked to the doctorate more as the pass-

[1] This letter is dated "6, Howe St., *Edinbro., Monday, Dec.* 28." The postmark gives the year 1835.

port to a profession, than as an honour, and his son, to whom the profession was more unwelcome than the title, was not equally desirous to meet his wishes. He still, however, went on with his medical studies.

On March 11, 1836, he writes to his father:—"I have been during the past and present month, mainly occupied with the writing of my Thesis, which has indeed taken up more time than I can conveniently spare. Yet it is a task which must be performed, and which ought to have an influence with the Professors, though I am afraid some of them do not care much about the merits of a Thesis, especially a botanical one, as mine is. As a medical one from me would have been a mere compilation, and of no use hereafter, I preferred writing an original one, even though the subject may lead to a dispute as to the propriety of doing so. The two Natural History professors wish to see Natural History theses introduced, and have expressed their intention to support any student so doing.

"In May, I go up for my first examination. I fear much it will be a severe one on some points, as I have every reason to expect no quarter from one or two of the examiners. I shall do my best, however, to get through, and contest the point should I meet with any unfairness.

"My medical studies are sadly in the way of my scientific and literary pursuits and views. I can get nothing done in Natural History at present, which annoys me exceedingly, inasmuch as I have many opportunities, indeed more and more every day, of turning my scientific researches to ultimate advantage. The

summer, too, *must* be spoiled in the same way, for should it be destined that I am to pass my first examination, as I hope it may be, I shall have doubly hard work for my second, of [for] which, from 'circumstances over which I had no control,—the death of the Professor of Materia Medica, ere he had half-completed his course, and the useless lectures of the Professor of Practice of Physic,—I am, in common with all those who commenced in 1831, but ill-prepared." From a postscript to this letter, it appears that he is still attending Dr. Seller's private examinations.

To his student friends he expressed himself still more unreservedly. In a letter to Dr. Percy,[1] of date, October 10, 1835, he thus writes from the Isle of Man, looking forward to his approaching examinations :—"The next winter will be a most uncongenial one to my habits. I must pass, if possible, and to tell the truth I abhor the profession and despise the degree. And now for Botany."

The "if possible," the counterpart of the "should it be destined I am to pass," of the letter to his father, was not a superfluous phrase. May was the month of trial, but on the 24th of the preceding April, he writes from Edinburgh to Percy in Paris :—"I am as ambitious as you are of discoveries beyond the Equator—the expedition of my day-dreams being the crossing of New Holland through the centre, if possible. We might some day or other do it together. As it is, I am quite lost to the medical profession, finding my professional know-

[1] One of his earliest friends at College, and afterwards his colleague in the Government School of Mines, London.

ledge so defective, that I have been obliged to give up all thoughts of taking my degree here this year. In short, from this day I mean to devote myself wholly to science and literature, trusting that my devotion to their cause may yet interest fortune in my behalf and not (*sic*)[1] bring me in, before many years roll over, some remuneration for my exertions." The vow thus recorded was kept, and Medicine as a profession finally abandoned. A few particulars concerning the last effort to become Doctor Forbes are furnished by Dr. Bennett. "On the approach of spring 1836, it became necessary for Edward Forbes to prepare for his examination, at the prospect of which he manifested on all occasions the greatest repugnance. But as the necessity of 'going up' was strongly urged by his friends, and as he was deficient in the requisite knowledge, the writer of this sketch [Dr. Bennett] (being at the moment considered chief *medicus* of the set) undertook to grind him in anatomy and physiology. With great trouble we at length forced him to write out his schedule of study, and send it in to the secretary's office. Then commenced many dismal evenings of yawnings over the bones, and anatomical books, of which he soon became weary, often arranging with friends to come in at the time when he thought he should be tired of such work. We need scarcely say that Cloquet's Anatomy and the bones were then thrown aside for an evening of gaiety and philosophical discussion. . . . After this it need not be wondered at that, when summoned to appear on a certain

[1] The *not* is plainly a clerical error. In a note to this very letter he writes: —"Excuse blunders, as I never re-read my letters."

afternoon, he at the appointed time was *non inventus.*"

To one aspect only of this transaction does reference seem necessary. In one of the letters to his father he alludes to the severity with which he is likely to be treated by certain of the examiners, and to the possibility of unfairness being shown him. His apprehension of unfairness was certainly groundless, and can only be set down as one of the baseless alarms which characteristically haunt the imaginations of students "going up" for their degrees. His expectation of severity (but not of over-severity) was better founded. The professors of Botany and Natural History appreciated him as a man of rare genius, accomplishment, and power of work, but to the majority of their colleagues, as to the University in general, he was familiar only as an eccentric youth, conspicuous by his long hair and moustache, and known to be the editor of the audacious *Maga*, and the designer of the irreverential portraits of academic dignitaries which were weekly displayed at the College gate. Edward Forbes knew this, and the conscience which makes cowards of us all, doubtless brought before him various productions of his pen and pencil, which were not exactly calculated to propitiate examiners in his favour, even where they themselves were satirized in the most harmless way. Dr. Hope had one all-comprehensive denunciatory phrase, "strictly unacademical," which stamped as under the professorial ban whatever it was applied to. I scarcely know what about Edward Forbes —the long hair; the then *outré* moustache; the red ribbon across the breast (of which more presently); the portrait

taking in the class-room—would have failed to be included in the damnatory category.

Forbes doubtless realized all this, and felt that he could not expect leniency at the hands of the examiners, and the transition was easy to the exaggerated fancy that they would do their best to reject him. His judgments of other men were generally most charitable, and this exception will surprise no one who has had personal or relative experience of the feelings with which overtasked students, out of health and doubtful of success, regard their prospective examiners. They invariably figure them to themselves, as if each was a Spanish Torquemada, or English Judge Jeffreys. Here in his own serio-comic fashion is Forbes's acknowledgment of the fact:—

THE VISION OF ONE "GOING UP."

A FRAGMENT.

'Twas after dinner, yesterday, I sat,
In my arm-chair before a blazing fire,
When most somniferously sleepy, I,
In consequence of loaded stomach, felt,
And to promote digestion thought it best,
To put the candles out and fall asleep.
. . . . . .
Methought that most eventful day had come
When I before professors most austere
Must go and undergo examination,
And that I sat me trembling and afraid
On the stone steps of famed Physicians' Hall,
Unknowing how to knock and ring through fear,
Dark fear and trepidation, spirits which
Too long have terrified the youthful mind,—
At first in shape of birch and sugar-cane
(Some say bamboo, and others nine-tailed cat),
And then assuming human countenance,
In form of frown, and taunt, and scornful smile:
When as I sat, there came from out the door
A poor rejected student, whose pale looks
And palpitating heart bespoke his fate,
Still stronger told by sight most horrible

Of prussic acid bottle in his hand,
The final finisher of all his woes;
And at his heels a fierce examinator
Rushed reckless, with a loud-resounding laugh,
When me espying, in he bade me come,
And meet my fate,—entranced by the gaze
Of his fierce eye, and by the solemn sound
Of voice used to imperative command,
I followed him instinctively, and saw
A sight which sickens me to recollect.
There in a lofty and a lengthy hall,
Around a table covered with green baize,
Sat the Examinators,—animals
Of wondrous shapes, with horns, and bills, and claws,
And hoofs, and asses' ears, and grinding teeth,
Wherewith to torment and to terrify
The luckless student, who, unknowing what
A horrid fate awaited him, came there
In Sunday clothes to seek for a degree.
. . . . . .
There came a horrid shriek across my brain,
And in excess of terror I awoke,
Then thankful found myself once more alive
In my arm-chair's embraces, by the side
Of half-exhausted fire—so breathed a prayer,
And rang my bell for a supply of coals,
Then reading Cloquet fell asleep again![1]

It may surprise some, and seem to them a sign of weakness of will, that a man of Forbes's intellectual capacity and power of work, should not have doggedly stuck to Medicine and taken his degree, as so many men of far inferior powers have done. But if I feel tempted for a moment to concur in this surprise, and to affirm that he would have saved time and avoided fret, had he made short work of Medicine and returned, crowned with his degree, to Natural History, I feel compelled to pause for two reasons.

1*st*, The period of his nominal study of Medicine was not one of idleness, but of such devoted labour to Natural History as in the end produced the most splendid

[1] *University Maga*, No. IX. for March 5, 1835.

fruits. And who shall say that if these precious years, which lie between eighteen and twenty-three, had been absorbed by Medicine, we should have seen any such fruits at all?

2*d*, The only motive which induced him to attempt the study of Medicine, was the wish of his parents, or rather of his father, who desired to see him attached to a profession by which he could support himself. It very soon, however, became most evident to Forbes, that though it might cost him no immense effort to obtain a medical degree, it would be an utterly useless title, for he had no fitness for the duties of medical practitioner. On the other hand, he felt that exceedingly few were qualifying themselves, as he was diligently doing, for a chair of Natural History, and that he might reasonably hope to fill the most famous chair in the country. Meanwhile, there were lesser lectureships and appointments, one or other of which he could scarcely fail to get, seeing that Botany, Geology, and Zoology, were equally familiar to him. He was actuated thus by a wise policy in what seemed to many, mere caprice or self-indulgent idleness. The death of his mother removed one of the only two persons in the world who specially desired to see him a doctor; and she left him property held in her own right, so that in pecuniary matters he was so far independent. It remained then only to satisfy his father that a medical degree would be useless to him, and he seems to have found no difficulty in this, for there is no rumour, or trace of any difference between them, and his allowance continued to be as liberal as before. He celebrated his emancipation

from the fetters of Medicine, by energetically aiding in the foundation of a Botanical Society in Edinburgh, a proof alike that love of idleness was not the cause of his abandoning Medicine, and that he had not forfeited the esteem of his peers or seniors by its abandonment.

So ended the endeavour of Edward Forbes to become a physician. For five years he had nominally been training himself to win with distinction an honorary title, and just when it was within his grasp he flung away his weapons and folded his arms. Of the five sciences on which in the first examination he would have been interrogated, he could have taken in Natural History and Botany a place far above that which even the most distinguished graduates of his own, or of later epochs dreamed of attaining. In Chemistry, his answers would certainly have been much beyond the average. In Physiology his knowledge, apart from Pathology, was unavoidably large, and the Professor and Examiner, Dr. Alison, was one so kind and gentle that no student feared to enter his presence. Only on the minute intricacies of Anatomy, which are justly demanded from the future surgeon and physician, was his knowledge defective. But Dr. Monro, though given to put unexpected and often unanswerable questions, was not an unfair or severe examiner, and Forbes, had he cared to do it, could easily, even without the friendly assistance which was at his command, have mastered more minute anatomy than would have satisfied all the three Monros as examiners.

The subjects also of the second examination were more familiar to him than even his own letters imply. He could easily have been puzzled by many a question on Practical Medicine and Surgery, but he could apply their principles when occasion demanded. Dr. Bennett has, I believe, done him unintentionally injustice in this matter. His delight in watching the ways and manners of men took him to the wards of the Hospital, as a place for such study, apart from its relation to medicine. He has told me of incidents in the Royal Infirmary of Edinburgh, which implied that he was no stranger to its wards; and when, in fulfilment of his vow to study only Science and Art, he went in 1836 to Paris, he made an exception in favour of the Hospitals, of which he says, in a letter to Percy:—

"*Nov.* —, 1836.

"I propose spending the winter in Paris, mainly studying Natural History, for I have *almost* cut Medicine, though curiosity will, I hope, induce me to walk the Hospitals every other morning."

When, moreover, he was attached to the Beacon surveying-vessel, he acted for weeks together as surgeon to the tender, in which he carried on his indefatigable dredgings.

Let no idle medical student, therefore, who dare not face the Examiners, justify his cowardice by an appeal to Edward Forbes, unless he can show that he is pre-eminent in two-fifths of the subjects of the first examination, eminent in four, and quite able to master the fifth; and unless further he can show that, in recompense for declining to attempt this, the time which it would have

occupied to small medical purpose, has been expended in realizing scientific results of the highest value.

So his biographer can now plead, but few would have pleaded so in 1836; and we could not have blamed his father, if he had insisted on his son's taking a degree, and qualifying himself for the medical profession.

To most but himself he seemed to have made shipwreck of his genius. He had tried two professions and failed: Art disowned him; Medicine disowned him. To be a virtuoso man of the world appeared the goal of his ambition.

So it seemed, but so it was not. His genius had reached its nadir, and, though none knew it less than himself, half its course was spent. It was from this moment daily to mount higher and higher above the visible horizon, till it reached, and for too brief a season shone from, the zenith.

When he parted from Fine Art, he uttered a goodbye, not a farewell, and in token thereof he took his pencil with him. When he parted from Medicine, he asked to retain his scalpel as a memorial of the art of dissection which she had taught him. With these two simple tools alternately in his hands, and, as guide and interpreter of both, the microscope at his eye, he had such a triad of things as pleased his fancy, and occupied all his faculties. What use he made of these, and how he added another "mystical triangle" to the effective apparatus of Natural History, we are now to see, but before doing so, we must retrace our steps a little to mark some aspects of his life during the years nominally devoted to the study of Medicine.

CHAPTER VII.

STUDENT CLUBS.

THE five years spent by Edward Forbes in the study of Medicine were not years of mere mental toil and solitary relaxation. It was an eminently social and happy time; social to a degree far beyond the average of Edinburgh student life. His sunny spirit received a welcome everywhere, and drew together all that was generous and enthusiastic within its sphere. Not merely students of natural history and of medicine, but of art, of theology, and of law, clustered around him. Differences of taste, pursuit, profession, rank, or nation, seemed ever to melt away before him. Wherever he found an earnest trueheartedness, it was enough to secure to its possessor the fellowship of Edward Forbes.

There was something characteristic, too, in the nature of this social element. It did not confine itself to mere festivity or idle gossip. None indeed could sing a funnier song or keep a merrier table. But Forbes went further; he sought to bind his companions into a brotherhood of earnest workers and true men. Song and joke at one time, sober talk at another, and ever the example of his own buoyant and truth-loving spirit, were the means whereby he sought to attain his end.

And so it came to pass that this feeling, which had always been a dominant one, at last took a more definite form. Forbes and three of his fellow-students resolved themselves into a society or brotherhood for mutual encouragement and assistance in the search of truth. They gradually added to their number, though with scrupulous care, until eventually brethren were to be found over the whole empire, and in almost every city of Europe and America. The society, though its vitality has passed away, is not even yet wholly extinct. Its foundation and early progress cost Edward Forbes not a little thought and labour; he took an active interest in it even when many hundred miles away in the Ægean Sea; amid the toil and bustle of a professorial life in London he continued to regard it as his special care; and when matters in Edinburgh seemed to be getting wrong, he resolved to leave London in order to set them right. In short, this society exerted no unimportant influence on the career of Forbes; and the history of his connexion with it affords us glimpses into his own inner nature, as well as the key to part of his later life.

It started with vigour enough, certainly, but without the promise of yielding very desirable results. Not indeed until it had been some months in existence were its ultimate ends defined. At first its aim was a vague, confused one of upholding good-fellowship, satirizing the obnoxious professors, marking out what were called "snobbish" students for ridicule, advocating the rights of the University, printing doggrel verses, and cutting up things in general. And this medley of objects found

its development in a weekly journal, entitled *The University Maga.*

It was in the winter of 1834 (Forbes's fourth year at College) that Charles Erskine Stewart, Donald Macaskill, Edward Forbes, and James Brotherston Laughton, constituted themselves the "Maga Club." Erskine entered College in the same year with Forbes, and studied first Literature, then Medicine. He was the prime mover in the "Club," and continued its President until 1836, when he joined the army in India. Forbes had an especial love for him, as indeed he could not fail to have, for Erskine's enthusiastic spirit and literary power were characteristics that Forbes knew well how to prize. Macaskill had likewise attended the medical and literary classes, and Forbes valued him not only for his sterling qualities of heart, but for a strong poetical vein with which our naturalist warmly sympathized, and which as warmly sympathized with him. Forbes was ever ready with some *nescio quid nugarum* for Macaskill's criticism, who himself also wrote verses which his friend highly esteemed.[1] Laughton was studying for the Church, having entered College with Forbes in 1831.

The professed objects of the Maga Club were literature and good-fellowship. The latter seems at the outset to have been of a somewhat vigorous kind, seeing that each club-night was ushered in by nine standing

[1] Among Edward Forbes's early papers there is a manuscript dedication of a volume of verse to Macaskill. Though never published, the poems were actually written. They related chiefly to the passions, pursuits, and pleasures of student life, and the greater number had been seen by Macaskill alone. Indeed, it was owing to the advice of his two friends, Macaskill and Stewart, that Forbes had resolved to publish his effusions, and this dedicatory epistle shows how highly he valued their opinion, and how warmly he cherished their friendship.

toasts, beginning with "*The University Maga*," and concluding with "Rule Britannia," and a heavy penalty lighted on the head of any member who evaded one of these. Such at least was the tenor of the "Rules," though it does not appear that they were very strictly followed. By degrees, indeed, their spirit greatly changed. The "good-fellowship" remained as strong as ever, but its circle grew wider, and it became eventually almost wholly a sympathy of head and heart in the pursuits and professions of life.

But the great feature and boast of the Maga Club was *The University Maga*. In the preparation of that weekly sheet, the "Magi" vindicated the first resolution of their club—the cultivation of literature.[1]

Here weary students, groaning under the dreariness of lectures which they took small pains to follow, poured out their wrath against the hapless professors. We have

[1] The publication of such a magazine was no new thing in the history of the Edinburgh University. The following passage occurs in No. VII. of the *University Maga*:—"Of the many [University] periodicals which have appeared within a few years back, such as the Lapsus Linguæ, Heliconian Gazette, College Observer, University Magazine, Nemo, Anti-Nemo, Squib, and University Journal, three only have existed an entire session, viz.: the first, the third, and the fourth; whether the first paid its expenses we cannot say; the third barely did so; the fourth did not. All varieties of style and matter were tried to insure success; in the first, second, and fifth, there was fun for a few coppers; in the sixth and seventh they had personality for ditto; in the third they had serious literature for ditto; in the fourth they had an excellent literary magazine for a shilling; in the fifth mentioned they had literature and science for sixpence: and these, too, at all manner of periodical issuing, weekly, twice a week, once a fortnight, monthly. Nothing would do." The starting of the *Maga* revived the mania, and two other journals appeared as its rivals; but they both died a natural death before the completion of the winter session, while the *Maga*, after taking weekly occasion to ridicule her competitors, held on triumphantly to the end. The writer of the article from which the foregoing passage is taken, nevertheless confesses that the *Maga* had not been supported as it ought. He concludes—"Though the price be but a few pence, yet will our beneficent brethren depute one out of every fifty to buy a number, in order that all may read. They enjoy, but will not pay for their enjoyment." Two sessions afterwards (viz., in 1837-38) the *Maga* re-appeared once more in greater vigour than ever, as we shall see in a subsequent chapter.

seen in a previous chapter that this kind of good-natured revenge suited the taste of Edward Forbes, and some of the satirical verses are evidently by him. Some of the oddities about College came in for their share of attention, particularly a Quaker pastry-cook in the vicinity, who, under the cognomen of "Margo Lata," or Broad-Brim, is made the subject of a doggrel Latin ode. The *Maga* was first published on January 8, 1835, but by some unlucky mischance, No. II. preceded No. I., which did not appear till the next week. By way of apology, it was gravely asserted that the parties concerned were "indeed so glorious, that they might well be afflicted with double vision, quaffing repeated bumpers in honour of the birth of the illustrious and ever-to-be-renowned *Maga*. But, friends, this is the real beginning, although it appears as the continuation, and thus the continuation is the beginning, and the beginning is the continuation."

Every Thursday a new number was hawked about the streets, and greedily devoured in the class-rooms. To each was appended a sketch by Forbes of one of the professors, or of some conspicuous individual of the neighbourhood, and along with it some explanatory remarks, usually not of a very complimentary kind. The verses on the "Anatomy Bill," given above, p. 95, were printed in the third number, and the pathetic "Vision of one going up," quoted at p. 182, formed part of No. IX.

The following passage from an article on the "Decline of Poetry about College," in No. IX, is characteristic of Forbes:—"Wonderful to relate (or more classically,

mirabile dictu), the sons of the scalpel send out more muse-enamoured gentlemen than all the other faculties put together. Recollect, we allude only to our own Alma. These rhyming Meds are the laziest race on earth; they hate their profession, and will not learn any other; they love literature and science with their whole soul, and look no farther for sustenance, or rather they forget sustenance altogether in their search after fame. They are all philosophers, metaphysicians, wits, philologists, naturalists, in short, everything but students of their own profession; yet if a lawyer, or a divine, or a man of figures ventures to attack physic and physicians, they pepper him with a caustic defence, well worthy of true sons of Esculapius. They seldom take their degrees, for a simple reason—never being prepared. It would be an easier matter for one of the tribe to pass for advocate or minister than physician. But they are, to a man, good fellows and clever fellows, the most intellectual set in the known world."

The editor of *Blackwood's Magazine* was regarded by the writers of the *Maga* as a sort of tutelar deity; allusions, odes, and songs to Christopher North abound throughout their pages; to him the volume was finally dedicated, and they have gone so far as to give a portrait of him at the end of No. IV. The likeness is by no means flattering;—a disreputable-looking, bull-necked man, with one hand thrust into his buttoned coat, the other into his breeches pocket, gazes complacently at a sheet of the *Maga* hanging from a board, and hawked about by a still more disreputable Irishman.

The twelfth and last number was published on 26th

March. It concludes with a "View of the Symposium," after the "Noctes Ambrosianæ," consisting of songs, odes, speeches, toasts, and merry-making, all rather weak, except the last, which was doubtless as hearty as young lungs and young hearts could make it. And so, after all its squibs and satire and personality, the *University Maga* ends as it began, in the most unbounded fun and good-nature.

Through this gateway of satire and frolic Edward Forbes entered into a higher and nobler fellowship. He, as well as his companions, began to discover that, after all, there must be some better co-operation than that of mutually ridiculing the unpopular professors and "snobbish" students; that "good fellowship" might be the cementing bond of a union embracing all who in literature, science, or art were striving to extend the domain of truth, or to minister to the higher faculties of their fellow-men. As week after week the *Maga* appeared, this feeling continued to gather strength, until, on the 9th March 1835, the "Magi," or members of the *Maga* club, resolved to found a brotherhood for mutual assistance and encouragement in their several spheres of occupation. C. E. Stewart continued president, "Archi-Magus," or "Grand Master," with Forbes, Macaskill, and Laughton, as his deputies. Canons were framed for the government of the order and the admission of members. The words ΟΙΝΟΣ, ΕΡΩΣ, ΜΑΘΗΣΙΣ (wine, love, learning) were adopted as the watchword. As outward symbols of their union, the members wore across the breast a narrow silk ribbon, rose-coloured and black, with the mystic letters O. E. M. worked into its texture;

also a small silver triangle with the favourite Greek triad engraved thereon. Of these insignia, the triangle was to be worn at all meetings of the Order, while the ribbon was meant to be always visible across the breast. And this rule was by some of the members, such as Forbes, most conscientiously observed.

Such were the outward tokens of this union; its spirit and aims may be gathered from a sketch drawn out by Forbes, gradually modified and enlarged, and afterwards printed as follows:—

"The highest aim of man is the discovery of the Truth; the search after Truth is his noblest occupation. It is more; it is his duty. Every step onwards we take in science and learning, tells us how nearly all sciences are connected. There is a deep philosophy in that connexion yet undeveloped; a philosophy of the utmost moment to man: let us seek it out. The world in which we live is a beautiful world, and the Spirit of Omnipotence has given us many pleasures and blessings; shall we not enjoy them? Let us refresh ourselves with them thankfully, whilst we go forth in our search after Truth. We are all brethren, but it has pleased God variously to endow our minds. Some delight in one thing, some in another. Some work for the good of the body, and some for the good of the soul. Let us all

work together in fellowship for our mutual happiness and joy. Wherefore should men quarrel one with another, because they hold different doctrines? Such as seek for Truth in the right spirit sympathize with each other, and, however opposite may be their present opinions, revile them not, but assist in their development, knowing, however wide apart may seem the paths they have chosen, one goal is aimed at, and if persevering, both must meet in the one wished for temple. Let those who feel the spirit to develop the Wisdom of Creation, and to act for the good of their fellow-men, strong within them, unite together in a bond of fellowship, each Brother devoting his time and his energies to the department for which he feels and proves himself best fitted, communicating his knowledge to all, so that all may benefit thereby, casting away selfishness, and enforcing precepts of love. By such means glory shall accrue to his order, so that it may wax powerful in intellectual strength, and become a mental and a moral safeguard to the world, and a bond of union among all nations. Such is our Brotherhood."

The spirit of the Order, and the nature of the qualifications requisite for admission, are still further exhibited in the subjoined canons which were printed and circulated :—

"This Brotherhood is a Union of the searchers after Truth, for the glory of God, the good of all, and the honour of the Order, to the end that mind may hold its rightful sway in the world.

"It is a Fellowship demanding of its Members earnestness, ability, and philanthropy, and recognising among

them no distinctions of nation, party, rank, or profession.

"Works done and approved, a sincere and loving spirit, and the energy to act, are the qualities required of the Candidate.

"Love for the good and the beautiful is demanded of the Brothers, as well as the determination to seek for truth, and urge others to the search. Charity to all earnest opinions, kindness to all living creatures, and thankfulness for the blessings by which we are surrounded, are inculcated on the Brethren.

"Co-operation in research, assistance in danger and adversity, advice and firm friendship, are extended by the Brethren towards each other.

"The Triangle, symbolical of learning, love, and fellowship, and the Roseate Band, emblematical of their union, are the outward signs by which the Brethren recognise each other throughout the world."

It would be out of place here to enter into the details of the working of the Brotherhood; of its two grades, "Associates" selected with care from the outer world, and adorned only with the ribbon and "Triangles," to which the first was a preparatory stage; of its nine ceremonial officers, "Bearer of the Holy Triangle," "Bearer of the Mystic Lyre," "Bearer of the Banner of the Holy Triangle," etc., and an anomalous dignitary who flourishes "The Holy Poker;"[1] of its ceremonies of admission, its "conclaves," "assemblages," and "meetings." These

[1] From a protest of Macaskill in a letter to Forbes, it would seem that the addition of this title, as one might almost have guessed, was a sly joke of Forbes's own.

things were only the outer shell, carefully enough attended to at first, but many of which became eventually obsolete. One feature, however, in connexion with one of Forbes's characteristics, deserves remark. We have seen in the previous chapters what an affection he had for a trinity of things, and how lovingly from his earliest years he used to sketch the triangular symbol of his native island. This fondness found ample field for its exercise in the organization of the brotherhood, which, doubtless, owed its form mainly to him. The Order was founded on the *ninth* day of the *third* month, its symbol was the *triangle*, its motto a *triad*, its ceremonial officers *nine*, the hour of meeting *three* minutes past *nine*, and so on.

For upwards of three years the Order had no definite name. The discontinuance of the *Maga*, and the enlarged spirit of the society, rendered the old name—"Maga Club," no longer appropriate. In some of their papers it was styled "the most powerful brotherhood, proclaiming itself by the words ΜΑΘΗΣΙΣ, ΕΡΩΣ, ΟΙΝΟΣ," and each document bore on its front the mystic triangle and O. E. M. Hence they sometimes called themselves *oinero-maths*, and talked of their "bosoms glowing with *oinero-mathic* fire." C. E. Stewart, however, on his return from India in 1838 (he had quitted Edinburgh in 1835), denounced the term as "a barbarous compound," and proposed to adopt the title that had been suggested by a French *frater*, M. Jalabert, "The Universal Brotherhood of the Friends of Truth." This, accordingly, became the recognised designation.

It required no great foresight to conjecture that the

appearance of a band of young men flaunting about college with conspicuous red ribbons over their breasts, understood, too, to hold secret conclaves (not, perhaps, for the very best purposes), and evidently steeped in freemasonry and mysticism, would be hailed with no small amount of ridicule. That the ridicule did come, is very evident from the language employed by the leaders of the set, specially by Forbes, to solace the brethren and vindicate the dignity of the Order. In one of his addresses to them, he says: "A fancy regarding us has gone abroad which it should ever be a duty on our parts to combat, namely, the idea that our Order is what is called a secret society, that we have passwords and signs and mummeries, known only to ourselves, and that initiation into our brotherhood is not merely the union of one intellectual mind with another, for a noble and an open purpose, but an introduction to secrets and fancied mysteries of our own. Such a fancy is very liable to be adopted by two very different classes of persons, such as are imperfectly acquainted with our fellowship and its objects, and such as have not the capacity to comprehend our motives. The former class it becomes us to undeceive; the latter was formed to obey; it is our business to guide them to the truth." And the Archi-Magus triumphantly demands whether "any one real truth has ever yet been overthrown by a sneer." Notwithstanding these and other comfortable words, however, we find traces of some delinquents whose "oineromathic fire" had not been proof against the cold breath of the world. Luckless brethren! their names were unworthy of a place on the roll of the Universal

Brotherhood, and they descended once more into the outer world!

In no point were the canons more strictly followed than in the election of new members. A candidate had to show, by actual work done, that he would be likely to further the interests of the Order, and diligent inquiry was made as to how far he had developed in him the necessary spirit of geniality and good-fellowship. If he failed in either of these respects, his election became highly improbable. Even if elected, he only attained the dignity of associate, and had to manifest fresh diligence and zeal before he could be raised to the honour of the mystic Triangle. The Brethren exercised a careful vigilance over each other. All reports touching the good name of any *frater* were rigorously investigated, and it went hard with him if these reports turned out to be true. Vice in every form lay under the ban, for they were to be a band, not only of earnest workers, but of honourable and virtuous men. Whatever was mean or selfish stood in direct antagonism to that spirit of truth which so essentially characterized the brotherhood.

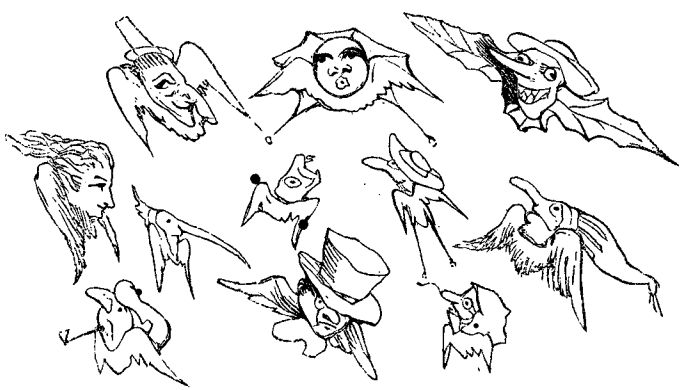
One cannot fail to notice how typical of Forbes's after career were the spirit and aims of this society. Its aim truly was a lofty one: its members were to devote themselves to the high and onerous task of studying and elucidating the wondrous world of Truth that lay around them. To this, as to the central duty, all other duties were to converge, and with this as its ultimate end was every pursuit to be undertaken: it was, in short, a kind of leaven, by which the whole life should be influenced. The Order embraced students not only of

nature, but of medicine, of theology, of literature, of law, of art; all, indeed, who were willing to carry with them into their profession, whatever that might be, the earnest truth-loving spirit of the Order. Thoroughly catholic, it knew no distinctions of rank or sect or nation; it aimed at breaking down all the barriers, social or otherwise, which impede the free current and interchange of sympathy, that thus all the separate and solitary rivulets of inquiry and thought might at length flow into one broad, deep river, onwards to the ocean of Truth. This end, they believed, could be accelerated by a cordial co-operation and sympathy in the pursuits of life, and hence they bound themselves to regard each fellow-member as a brother in whose welfare all were concerned, and whom, in difficulty or distress, they were to counsel and assist. And then, as the oil that kept all this machinery in easy motion, there lay a hearty geniality and good-fellowship, and an abhorrence of everything that came under the designation of "snobbish." There was to be no scientific cant amongst them. They believed that a man of science might be as full of mirth and gaiety as any other man, and that the search after truth to which they had bound themselves, though doubtless a serious and onerous pursuit, was nevertheless quite compatible with a keen relish for all the amenities and socialities of life.

Such was the spirit of the "Universal Brotherhood of the Friends of Truth;" and such, too, were some of the leading features in the character of Edward Forbes. That scientific Freemasonry seems indeed like a visible manifestation of his inner spirit, his large-heartedness, his love of truth, his geniality, his high views of the

destiny of science, are all there behind an outward show of mysticism, and a boyish love of oddity and display. In the institution of this Brotherhood, to which he gave so much of his time, he sounded, as it were, the key-note of his scientific life, and in all his after career, amid new scenes and new circles of friendship, it remained the key-note to the end.

The after progress of the "Brotherhood" will be noticed in subsequent pages. But before resuming the narrative, where it was dropped at the end of the preceding chapter, we must turn to look at another of the features which marked the five years of Edward Forbes's medical life.



CHAPTER VIII.

VACATION RAMBLES.

THE summer classes at the University of Edinburgh close about the end of July; the winter session does not commence till the beginning of November. Three full months are thus at the student's disposal, and precious months they ever were to Edward Forbes. Released from the duties of the class-room and the hospital, he started off on long autumnal rambles, with a light heart, a keen eye, and a ready pencil. His first vacation was spent, as we have seen, in the Isle of Man, dredging its bays, searching its shores, and roaming over its valleys and hills, with the new light and enlarged information gained at college. Next autumn witnessed a greatly more venturous feat in a trip to Arendal, and a pilgrimage through part of Norway,—the first of his foreign tours.

It was towards the close of the session 1832-33 that Forbes and his fellow-student, the present Principal of the University of Aberdeen, after a conversation on Inglis' (Derwent Conway) *Norway*, etc., resolved to visit Norway during the ensuing summer. The voyage could easily be made, for every summer saw many timber-vessels from Norway in the ports of Man, and it was accordingly arranged that Mr. Campbell should spend a

short time with Forbes in the island, and then start with him for the north.

By daybreak, on Monday, 27th May 1833, the brig "Patientia," of Arendal, had weighed anchor and sailed out of the port of Ramsay. Her two passengers, Forbes and his friend, had carefully equipped themselves for a scientific tour, by gleaning what they could learn as to the natural history of the region to be visited, and by taking with them a supply of botanical paper, boxes, hammers, etc., and a goodly store of natural history information. Thus furnished, they began their observations from the time they stepped on board. Gurnards, awks, gulls, solan geese, medusæ, isopoda, grampuses, porpoises, and other inhabitants of the deep, were duly chronicled on the first day of the voyage, and no opportunity was lost, either by fishing-line, greased sounding-lead, or gun,[1] to gain new material for study. Adverse winds kept them for a day or two beating about the Irish Sea, but a freshening breeze from the south eventually swept them pleasantly through the North Channel into the Atlantic. The wild, bare island of Barra was the first land sighted, and their course then lay through the Minch, tacking between the chain of the Outer and Inner Hebrides. But the mists lay thickly upon the hills, and the outlines of the islands were seldom seen, save when a favouring breeze lifted the curtain for a little, and showed a lonely expanse of grey barren rock and long in-running bays. Dunvegan Head stood out faintly in the haze, and though Forbes strained his eyes

[1] He had not yet made the dredge his favourite instrument of research, although he had learned its use both in the Firth of Forth and in the Irish Sea.

to recognise the vast basaltic cliffs of which he had heard, and amid which lived his friend Donald Macaskill, nothing distinct could be traced. Steering across the Minch, they skirted the coast of Sutherland, with the wild sea of mountains which forms its background. Wreaths of cloud still drifted along the sides of the hills, or hung upon their summits; but the sun shone out brightly, and the chequered light and shadow flitting across the landscape produced a powerful effect on the imagination of the tourists. As they neared Cape Wrath, however, the wind changed, and kept them beating to and fro for several days ere they reached the cliffs of Hoy. In this course they often approached the shore near enough to make out the character of the rocks. The horizontal sandstones of Caithness drew their especial attention, and as Forbes sat watching the coast-line—here a mass of tall crags, there a declivity sloping gently to the sea—he would fain have landed, for "there," he thought, "would be the habitat of the lovely and rare *Primula Scotica*, a plant whose fair features I long to see holding a place amongst the beauties of that vegetable harem, my herbarium."

On the evening of Tuesday, 4th June, the wind had almost died away, and the "Patientia" crept slowly through a glassy sea towards Hoy Head. The night of the North Sea in summer is like a lesser day, and hence, even at midnight the huge cliffs of the Orkneys, with the colossal "Old Man of Hoy," stood out clear against the sky. Under the lee of the island they waited the turning of the tide, which rushes with fury through the Pentland Firth. But after crossing to Stroma, they found them-

selves too late, and had to lie under sail on the west side of that island until evening ebb. Forbes begged to be allowed to land, and was permitted two hours on shore, and so, while the tide ran foaming and raging through the narrows, he employed himself in trying how far it was possible in two hours to exhaust the natural history of Stroma. The flat sandstone beds, evidently a part of the series of Hoy on the one side, and Dunnet Head on the other, presented few geological features of interest, save the caves and tunnelled caverns worn out by the Atlantic breakers. The ledges were crowded with sea-fowl, and the captain of the brig, who had maintained that the awk built its nest on tangle floating in the sea, was sent for, that he might have ocular proof that the bird preferred a safer and more stationary nestling-place. They collected forty-seven species of plants, and Forbes in his notes remarks, that "though he had not time to make a complete catalogue, he still thought it worth while to enumerate such as he met with, since, from the situation of the island, at the northernmost part of Scotland, any list, however imperfect, is of importance, as illustrating the geographical distribution of British plants." The entomological riches of the island were not great; no *lepidoptera*, the caterpillar of a *phryganea*, five species of *coleoptera*, one of which he conjectured "to be preyed upon by some other insect, as under stones were great numbers of faded wing-cases." At seven o'clock in the evening they set sail again, shot past John o' Groat's House, Duncansby Head, and the Skerries, with their two light-houses, and out into the North Sea.

After beating about for two days, the wind veered to the west, the sun shone out upon a sea, "than which," wrote Forbes, "never was sapphire more lovely in its blue," and they dashed pleasantly onwards

"To Norroway, to Norroway,
To Norroway, over the faem."

During the night of Sunday, 9th June, they passed the Naze, and on getting on deck next morning, "the coast of Norway lay before me," says Forbes, "and for the first time I beheld a foreign land, with the bright prospect of soon setting foot on it." Everything wore a novel aspect, the thousand isles and interlacing fiords, the endless undulations of the pine forests, the bare rocky shores, without verdure or fields or fences, the picturesque wooden houses nestling in an occasional green hollow, or perched on some almost inaccessible ledge, with the dark woods overhanging it and sweeping away inland. Within a few miles of Arendal a pilot came on board, and guided them through the labyrinth of channels into the fiord of Arendal. Of this fiord Forbes writes, "Never did I behold a more beautiful scene, perhaps more beautiful to me since it was perfectly new in every respect."

Ten days were spent at Arendal. The owner of the "Patientia," Mr. Hans Dedekam, an old correspondent of Forbes's father, welcomed the young travellers to Norway. Dinner-parties, excursions, botanical rambles, strolls through the town, and boating in its fiords, fully occupied the time, and Forbes's keen powers of observation had ample scope both in the new natural history world that was opening upon him, and not less in

the new phases of dress, manners, and society, which every day met his eye. Hence in his notes, notices of plants, insects, minerals, and rocks, are interblended with remarks upon the peculiarities of his breakfast, of his hostess, the custom of bowing and hat-raising to every one in the streets, the nature of Norwegian dinner-parties, dress of the peasants, etc. One costume struck him as "extremely ridiculous. A hat with a worked band and a very narrow brim is their head-dress; but the whimsicality is the jacket, which is very little more than two sleeves connected together by a piece of embroidered cloth peaked in front. Consequently, the trousers are buttoned round their necks, so that they look like a head with two legs and no body. Dandyism amongst them consists in the shortness of the jacket."

Among the excursions from Arendal was one to the iron-works at Naes, a distance of about fourteen miles. The journey was to be made in carioles, gigs seated for one individual, but the precipitous look of the roads determined Forbes to go on horseback, a mode of travelling, however, from which every one in vain endeavoured to dissuade him. In his notes of this journey the iron-works are dismissed in a couple of lines, but he dwells at greater length on a dinner-party where, to his surprise, the ladies and gentlemen sat on different sides, and regaled themselves with a soup made of red currants and sago, seasoned with raw salt-herrings, anchovies, and pickled salmon, completing the meal by a slice of lamb. He chronicles also having seen a copy of the *Flora Danica*, where a plant which had puzzled him was given as *Convallaria bifolia*; but, he adds, "surely

if a genus may be instituted, this should form the type of a new one; in no respect is it a *Convallaria*." Though pressed to remain a day or two at Naes, they were "all such figures with mud, etc. that they could not in decency remain." Accordingly, they returned by the same road, the precipitous character of which Forbes shows in a rough sketch, where, down a pine-covered declivity almost vertical, he and his companion are shooting like avalanches after the guide and another cariole, which, by the impetus of its descent, is still galloping over the lower ground.

On reaching Norway they had no settled route before them, but this was soon arranged when they heard that a steamer was about to sail northward along the coast. On the afternoon of the 19th June, after packing up the plants and minerals collected during their rambles, and bidding adieu to their Arendal acquaintances, they took passage in the steamer "Constitutionen" for Bergen. They chose this route, inasmuch as the vessel called at every town on the way, and always remained in port at night, so that they would thus have a favourable opportunity of becoming acquainted with the maritime aspect of the country. The deck was crowded with passengers, among whom Forbes found M. Blytt, lecturer on Botany in the University of Christiania, who, with one of his students, was about to explore the botany of the coast between Stavanger and Bergen. Two nights and a day were spent at Christiansand, the day in botanizing, and the second evening in a visit to the theatre to hear "two of the most famous Danish actors, Nilsen and Winslow." The next day brought them past the Naze, along intri-

core channels, and even through the centre of villages, to Egersund, where they anchored for the night. The ascent of a hill here [illegible]ed Forbes that the vegetation was now "decidedly (sub-)alpine," and as the flush of sunset spread over the wide expanse of pine forest and barren rock, he marked not a few of the hill-tops capped with snow. At Stavanger they visited the old church, had a fine view of the distant mountains, remarked that the rock was chiefly gneiss with a little mica-slate, and saw a large gneiss boulder which measured roughly thirty paces in circumference and above eighteen feet in height. In the voyage from Stavanger the hills grew higher and still barer as the vessel advanced northward; about mid-day the distant snow-fields of the Folgefonden appeared in sight, and towards evening the travellers "gladly, amidst great crowds and honours, landed in Bergen, the largest city in Norway."

The "crowds and honours" were due to the festivities of St. John's day. The peasantry parading the streets in every variety of costume afforded no little merriment, but the tables were soon turned, for Forbes adds, "C. and I happening to have tartan trousers on, we attracted a mob in no long time, and the people seemed as much surprised at our dress as we were at theirs." During the intervals of fair weather, botany and conchology as usual filled up the hours;[1] some excursions were also made, as to Lysfiord, and to the country-seat of a merchant to whom they had letters of introduction. After a stay of a week, they left Bergen

[1] In one of his articles in the *Mag. Nat. Hist.* he says, "Amongst my Bergen treasures I especially value a quantity of shell-sand which I found in a spitting-box in my lodgings," VIII. 305.

on foot for Oos, about seventeen miles distant, with the view of visiting the glaciers of Bondhuus.

The rough nature of the roads, and the increasing weight of their knapsacks, made pedestrian travelling no easy matter. "It was our first decided tramp under the knapsack in Norway; and what with our bags, and hammers, and botanical boxes, and books, we were pretty well loaded, not forgetting boards enclosing the paper to dry our plants in."[1] By dint of walking and boating, however, they eventually arrived at Bondhuus. "We proceeded," says Forbes, "on horseback without saddles to the glacier, a distance of about seven miles, over a most rugged country covered with immense masses of rock flung down in all directions from the mountains; after crossing a lake formed by the melting of the ice, we arrived at the glacier. The sight was most beautiful; the undulations of the ice of great height, and the lovely blue colour from reflected light, presented a fine *coup d'œil*. This glacier forms part of Folgefond, but is diminishing yearly, and twelve years ago was several hundred yards from its present limits. Around it, amongst the rocks, were some fine cascades formed by the melting of the snow above. At the foot of the glacier grew *Cerastium alpinum* and *aquaticum*, *Silene rupestris*, *Saxifraga stellaris* and *caespitosa*, *Phleum alpinum*."[2]

From Bondhuus they sailed up the Hardanger Fiord, among huge cliffs plunging almost sheer down from the region of perpetual snow into the quiet waters of the fiord. They visited the Vöring Voss, walked, climbed,

[1] *Mag. Nat. Hist.* VIII. 306.

[2] Their host at Bondhuus was the same John Bondhuus who, eighteen years afterwards, conducted Professor James Forbes to the glacier.—*Norway and its Glaciers*, p. 134.

boated, botanized, and every day were soaked with rain. On Sunday, the 7th July, Forbes writes:—"Our clothes had been soaked through in our knapsacks, and we had no dry change, our paper was soaked with water, and our plants were rotting in our boxes. The clothes we had on had not been quite dry for five days running, and yet, through Providence, we are quite well, and I myself was never in better health. Accordingly, we prepared to rest ourselves for a day. After putting up my plants, I took a stroll around Graven, and found *Circæa alpina* growing in a neighbouring wood." These botanical notes come in often in a characteristic way. Tired, wet, or hungry, he yet must needs turn aside to gather something for his herbarium, and sometimes in describing the most magnificent scenery he suddenly drops into a quiet parenthesis that *Silene rupestris*, or *Origanum vulgare*, grows on the rocks of the neighbourhood. Crossing the mountainous country between the Hardanger and the Sogne Fiords, they ascended to the head of the Lyster Fiord, whence their route lay across the vast snowy range of the Sogne Field. This was a journey of no little difficulty; and to accomplish it in safety they had to forego their usual mode of pedestrian travelling, and cross the mountains on horseback. "On one occasion," says Dr. Campbell in reference to this journey, "we were waiting for horses, and were in danger, a rare danger among the worthy Norwegians, of being hustled and ill-used by some half-drunken boors returning from a market, from whom, as it was raining in torrents, we could not escape. Forbes's talent as a draughtsman stood us in good stead. Snatching up a

piece of chalk, he sketched with great rapidity on the door of the inn striking caricatures of one or two noisy fellows who had just left the party, and changed the rudeness of the others into good-humoured laughter and civility."

The change from pedestrianism to horsemanship proved in the end productive of an unforeseen difficulty. On descending into the valleys leading into the rich district of Gulbransdal, they found that they had neglected to change a sufficient amount of English sovereigns at Bergen. Their Norwegian money had now begun to fail. In vain they tried to reimburse themselves at Lomb: they were told that there would be little chance of success before reaching Lillehammer, a journey of about one hundred and twenty English miles, to meet the expenses of which their common fund of available cash amounted to five shillings sterling. Forbes thus describes the first day's travel under these straitened circumstances :—

"*July* 14.—Our cash after paying our bill, which amounted to two marks, was only about five English shillings. With a sad prospect, a fine morning, and a heavy load on our backs, we departed from Lomb, and walked (I must confess rather dull) along the side of its beautiful lake. Our dinner was but scanty, consisting of some slices of bread, and a little piece of dried beef which we had pocketed from breakfast. Towards nightfall we began to think of a bed, and, in order to save our cash for the high road, we prepared to rest in the open air, and built a hut of sticks to shield us from the dew. Supperless we went to bed, if I may so call the spreading out of our boards, knapsacks, etc.; it was rather cold,

but we contrived to have a little sleep for about two and a half hours, when we arose about one o'clock in the morning to proceed on our journey until the sun should heat the air, when we proposed to conclude our sleep."

They gained the post road to Christiania near Froen, and by dint of rigid economy and resolute walking reached Lillehammer on the evening of the fifth day, having walked, heavily laden, about twenty-four miles a day. At one stage they begged a night's lodging from the parish priest, but were directed, in bad Latin, to proceed two miles farther to the inn. Thither, accordingly, they trudged with gloomy anticipations; the innkeeper, however, received them kindly, and the day following a captain in the Norwegian army carried their baggage to the next stage. On entering Lillehammer they had only twelve skillings (fivepence farthing) left, but speedily replenished their stock by exchanging three English sovereigns. Remaining a day or two at that town to recruit, they again started off, and in three days reached Christiania. Here they found their boxes waiting them from Arendal, and they were thus able to doff the "tartans" and "appear in clothes without holes."

The first day at Christiania was spent in making calls. In the evening they went with Professor Rathke to the Botanic Gardens. Forbes criticises their arrangement, and remarks upon the defectiveness of the Herbarium, and the want of care in the selection both of plants and paper. "There is one thing wanting," he says, "namely, a good collection of Norwegian plants." Several natural history excursions, varied by rambles through the city, a visit to the Storthing, dinner-parties, and con-

versations with some of the Professors, altogether made the sojourn at Christiania a very pleasant one.

Dr. Campbell has furnished the following incident of the sojourn in Christiania :—"I remember," he says, "one morning being awakened very early by a low murmuring noise—a strange unearthly chanting. On opening my eyes I beheld Forbes, in the grey dawn, half dressed, swaying himself backwards and forwards in a chair, and pouring forth in cadence with the motion of his body a stream of octo-syllabic verses, which had a mingled savour of Scott and Tennyson, in the form of an address to some fairy of his imagination. The occasion was too good to be lost. I gave no sign of being awake, and stuffing my mouth stealthily with the bed-clothes, listened in breathless attention until the unmeaning extravagance of the sentiment, and the desperate efforts of the improvisatore to conform, without stopping, to the exigencies of rhyme and metre, brought on me an uncontrollable fit of laughter. As happens at cock-crowing, Forbes's fairy vanished, the Canto came abruptly to an end, and after his confusion had subsided, we laughed together over the occurrence."

After remaining a week at Christiania they proceeded onwards to Copenhagen. Their route lay by Drammen and Kongsberg, where they remained to see the silver mines, to Holmestrand. Thence the packet conveyed them to Gottenborg, where they spent a few days sight-seeing and making excursions. From Gottenborg the steamer carried them through the Cattegat past Elsinore, which Forbes declared to be "no more like Castle Rushen in Man (to which it had been compared) than a dog is

like a donkey." On the evening of the 14th August, they landed at Copenhagen.

This city, with its wide squares and numerous public buildings, palaces, churches, picture-galleries, museums, parks, rampart promenade, and many other objects of interest, seems to have delighted the artistic eye of Forbes. Here he met Hornemann the botanist, and went over the Botanic Garden and Library. An excursion to the country-seat of an acquaintance in the city enabled him to see a little of the country around. After a few days spent in Copenhagen and the neighbourhood, they proceeded to Elsinore, to take their passage in vessels bound for England. Forbes secured a berth in one which was about to sail for Hull, his companion in one for Leith. The wind being unfavourable they employed themselves in visiting the castle of Kronberg, botanizing by the way. Leaving Forbes on a hill-side, Mr. Campbell returned to make some preparations for their departure. The wind had changed, vessels were getting ready to sail, and he had only time to hurry on board, and despatch a messenger for Forbes. It was too late, however. Forbes got back in time to catch his own vessel, but the other had sailed, and the fellow-travellers did not meet again for eighteen years.

In a letter written by Forbes to Mr. Campbell after his return to the Isle of Man, he thus describes the voyage home:—"Of course you got your share of that dreadful storm which is said to have destroyed one-fifth of the East of England shipping. We were just cutting the stick, but, thanks to Providence, arrived safe at port, as you may guess when you see this letter. One tre-

mendous sea was nearly sinking us, but, luckily, carried away the bulwarks, which accident saved us. Captain Wilson was washed overboard, but was miraculously saved by catching hold of a cable, one-half of which was also floating. The mate was washed into the cabin, and I was set afloat in my berth. After that not a man could stand on the deck by himself; they all got hold of the rigging and stood there, and the helm was lashed, and a little sail only was flying. I got my head above the door to see the storm, and heard the consoling observation that the ship could not live in such a sea. A body and many pieces of wreck which floated by, told a sad tale of some.

"But melancholy, avaunt! and now for the pleasures of the voyage. Few must be the pleasures in such weather, but there was one, and that was good fare. We had roast ducks in the worst of the storm, and a rice-pudding when the sea threatened to swallow us up; and the captain and cook seemed determined that we should not go to heaven with empty stomachs. For my part, thank God, I had an excellent appetite. The captain, too, and his mate, and, I believe, the whole crew, were all staunch Tories, which was another comfort.[1] It was on the Thursday morning after we started that we gladly and thankfully saw the shores of "Merrie England" again. But shipwrecks strewed them like sea-weeds."

The botanical results of this Norwegian tour were

[1] The democratic spirit, so wide spread at the time of the Reform Bill, which seemed to Forbes about to subvert all that was most intimately associated with the greatness of Britain, and to supplant the love of science and abstract truth by a spirit of utter utilitarianism, had impressed his mind with a strong conservative feeling, which he retained to the close of his life.

written out eighteen months afterwards, and published in short papers in the *Magazine of Natural History* for 1835-36. These are remarkable chiefly as indicating a habit of close observation, and a considerable acquaintance with specific forms, and, above all, an ardent, enthusiastic love of the science. We can mark, however, that Forbes's mind was beginning to dwell on the geographical distribution of plants, and that these rambles were paving the way for that enlarged philosophy of distribution developed in his later writings.

The summer of 1834 appears to have been mainly spent in dredging the Irish Sea, and continuing the exploration of the botany, zoology, and geology of the Isle of Man. The results of the dredgings were given in the *Magazine of Natural History* for the following year.[1] Ten days in the early part of August were passed in North Wales, and in that excursion, of which some meagre jottings occur in one of his note-books, Forbes appears to have done little else than botanize. Old castles, lakes, hill-tops, and fine scenery, were visited as they happened to come in his way, but his main object was to gather as many of the rarer plants as he could. His notes consist chiefly of lists of the species collected. No occasion was lost, and many a plant was noticed and chronicled while driving rapidly along on the mail. His zeal, indeed, rises to a climax at the last, for we find that on the evening preceding the only remaining day he had to spend in Wales, he resolved to start next morning, at four o'clock, by the mail to Holyhead, to get some of the rare plants found there. He was espe-

[1] *Mag. Nat. Hist.*, Ser. I., VIII. 68, 591; IX. 191.

cially anxious to obtain *Cistus guttatus*, "But, after a heavy stroll up cliff and down cliff, and over the hill in all directions, I found nothing! ! ! and set off to Bangor with a heavy heart and a long walk of twenty-six miles before me, in addition to my ramble of eight at the least." The failure of his journey, however, did not abate the keenness of his botanical vision, for, in the next sentence, he mentions that in that weary tramp to Bangor he found by the road-side *Butomus umbellatus*, *Lepidium Smithii*, and *Sparganium simplex*. And so, with well-filled boards, he sailed again to the Isle of Man, where he appears to have remained until—towards the close of October—he set out for Edinburgh to commence his fourth year at college.

The summer of 1835 Forbes employed in a tour through France, Switzerland, and Germany, and gained thereby more natural history information, and achieved more original results than any of his previous excursions had yielded. In the early part of June in that year he started for Paris, and remained there three weeks. The notes which he made of this sojourn contain many criticisms of the public buildings, palaces, churches, sculpture, paintings, etc., along with some enthusiastic encomiums on the Jardin des Plantes. On the second day of his visit we find him quitting his sight-seeing to start off with Jussieu and his botanical class for a two days' ramble round Mont Morenci. Forbes's eye, keener than ever, seemed to detect, almost intuitively, every rarer species, whether of plant or insect, and the contrast between this quickened power of observation and that of his French companions seems to have struck

even himself, for he concludes his notes of the excursion by remarking that "the French students are apparently but poor botanists, though fond of it, and though they have such opportunities." He made one or two other botanical excursions from Paris, accompanied by some of his old college friends who were studying there at the time. But his delight was to repair to the Jardin des Plantes, and pore for hours together over the specimens in the Museum, and some of the volumes in the Library. On the 16th he writes :—"Spent the day at the Library of the Jardin des Plantes, consulting Ferussac, etc.; every book being at one's service. The Museum is, after the Louvre, the finest thing in Paris. Every part bespeaks the hand and head of a Cuvier; everything in order and approaching perfection, especially the fishes, which must be the finest set in the world—the birds also. I revelled principally among the molluscs, and saw many which I had long wished to see, such as the *Trichotropis*, the *Magelus*, etc. Hour after hour passes away there without perception. In the evening I went to the Tuileries." Again, on the 19th, he says, "studied in the library of the Museum, and in the Museum itself all the day; chiefly consulting Ferussac's great work, and following up his illustrations in the collection. The more I see of the Museum, the more admirable it appears." On the 23d, he feels that he ought to be setting out for Switzerland, but a lingering wish to finish his inspection of the Museum and the Louvre keeps him still in Paris, and so the whole of that day was spent in the Museum and Library. The results of these days of continuous study are partly apparent in

the copious extracts at the end of his note-book, from some of De Blainville's papers on the Mollusca, Draparnaud's *Mollusques terrestres et fluviatiles de la France*, with sketches of the species, several pages of extracts from Menke's *Synopsis Methodica*, and quotations from Leach, *Zool. Jour.* vol. ii. These notes, of course, represent also a careful inspection of the genera and species as displayed in the Museum. We shall see in a subsequent chapter how strongly these days at the Jardin des Plantes impressed Forbes with the educational advantages of Paris to a student of Natural History, and how materially they influenced his own subsequent career.

Having "bought a knapsack of the best quality, and stocked himself with *Paludina achatina*, and *Neretina littoralis*, also with *Carabus auratus*, the commonest and most beautiful insect about Paris," he completed his collections by a botanical excursion to the islands of the Seine, "a capital day's work." Next day he obtained his passports, took his place in the diligence for Dijon, "spent the greater part of the day in the Library," and started off on the following morning (3d July) on his way to Geneva.

He remained a day at Dijon, botanizing among the surrounding hills. He says, "Unfortunately I have no guide at present to identify the beautiful plants I gathered, *not one of which I knew*."[1] In Conchology, I was exceedingly fortunate, finding the *Cyclostoma macu-*

[1] The italics are his own. It may be remarked, once for all, that Forbes's handwriting, even at this early period, is sometimes scarcely legible. The scientific names are especially indistinct, being sometimes hardly more than one or two letters connected by a stenographic dash.

lata of Draparnaud, with *Pupa* ——, and *Clausilia* ——. In Entomology I found but little." On the evening of the 7th, he arrived at Geneva.

With some English fellow-travellers he sailed up the lake, and, baggage on back, started for Martigny, a walk of twenty-four miles, from the effects of which he suffered next day. His route then lay up the picturesque valley of the Rhone to Sion, whence he diverged to the left, crossing the mountain range by the pass of Gemmi, and noting on the way "many good insects, plants, and shells, and very splendid scenery." At the little inn of Schwarenbach, he parted company with the tourists, and remained two days "botanizing, and got many of the rarest plants of Switzerland." In the ascent of the mountains he had kept a constant eye on "the progress of Alpine vegetation," and in the journey down to Interlaken, he particularly directed his attention to the vertical range of the land shells. Under date "14th July," he records the species noticed, and on the opposite page gives a rough diagram of the Alps, with the comparative heights at which the species occurred. These data were afterwards expanded into a separate paper,[1] the earliest of his writings in which he has shown his love for an arrangement of the organic productions of land and sea, in distinct zones, according to their recession from the sea-level. From Interlaken he visited the Grindelwald, which he thought less beautiful than the glacier of Bondhuus in Norway; then Lauterbrunnen, where he procured some insects, and saw "decidedly the most picturesque place in Switzerland." Returning to Inter-

[1] *Mag. Zool. and Bot.* 1837, I. 257.

laken, he crossed the Lake of Thun, and so down the valley of the Aar to Berne, where he remained for a week with an English friend who had a farm near the town.

From Berne he returned, with some Swiss botanists, to Interlaken, ascended the Faulhorn, and obtained there some of the rarest plants of the Alps. He also found many Alpine insects, and fixed the limits of *Cyclas* as the highest bivalve (7000 feet). On the 21st, he went to Aarau, to attend the meeting of the Helvetic Society, a gathering of scientific men like our own British Association. There he met "the excellent botanist, Smidt, and many other eminent men." From Aarau his route by diligence lay by Basle, Freyburg, and Carlsruhe to Heidelberg, a journey which, as he makes no notes of it, save a few cursory headings, he seems to have continued without intermission. One incidental notice of the journey, however, and the longest of the number, is as follows:—"Naturalists and philosophers the same at Aarau as at every other place—good eaters and drinkers." Heidelberg detained him a day, spent partly in sight-seeing, partly in writing home, and partly, of course, in botanizing in the suburbs. He there "procured the excellent critical catalogue of German or rather European plants by Reichenbach." His journey down the Rhine from Mayence was somewhat hurried; with the scenery he was "on the whole disappointed." Descending as rapidly as the mud-banks would allow, his "whole amusement consisting in the fellow-passengers, in the few specimens of thorough Dutchmen who now and then came on board, striking aground, and catching fish," he

arrived in Rotterdam, whence, after sticking twenty-four hours on a Dutch mud-bank, he reached London in the beginning of August.

It is time now to return to where the narrative was dropped at the end of the sixth chapter.

CHAPTER IX.

HIS FIRST YEARS AS A PROFESSED NATURALIST.

THE spring of 1836 saw Edward Forbes finally renounce medicine, and devote himself formally to the study of nature. Released from the ties that had restrained him so long, he was free to choose his own course, and his thoughts at once adverted to the Jardin des Plantes, where he had spent so many delightful hours in the summer of the previous year, and to which he had inwardly resolved to return at the first opportunity. Accordingly, he arranged that the following winter should be spent in Paris. Till then he employed himself partly in what he calls "an oineromathic mission" to his friend Macaskill in Skye, partly in a trip to Bristol, to attend a meeting of the British Association, and lastly, in a sojourn of a few weeks at the Isle of Man. The notebook which he kept during the tour to the Hebrides is a meagre, and often hardly-legible, series of jottings of scenery, inns, and botanical localities, with some verses on Linnhe Loch, and numerous rough pencil-sketches of old castles, lakes, and hills; also many female faces, a fair damsel rescued by "an oineromath" from the grasp of a giant, interblended with the outlines of fishes, mollusca, and trap-dykes. Of this journey he

writes to Dr. Percy, "Bad weather caused it to be a failure, so far as botany went." In the same letter he adds, "In August I went to the meeting of the British Association at Bristol, and was much pleased, meeting with much kindness, and making many most valuable scientific friends. I picked up two or three tolerable plants about Bristol."

He left the Isle of Man about the close of November, and set out for Paris, with the view of spending the winter there among the classes and collections of the Sorbonne and of the Jardin des Plantes.

Unfortunately the details of his Paris life are but scantily preserved. The only account of this winter which it has been possible to recover is contained in a letter from Forbes to his father, which runs as follows:

"Hôtel de Corneille, Paris, 17*th Dec.* 1836.

"My dear Father,—Since I arrived here I have been in very good health. In general the change of diet and manner of living does not agree so well with British students in their first month or so. The day after I wrote to you, I took rooms in the hotel from which I direct this letter, for which I pay forty-five francs a month. I am in the students' quarter, and in the midst of the colleges and lecture-rooms on the left bank of the Seine. I am on the look-out, however, for a *pension* or boarding-house, where I might live more comfortably and cheaper, though a good one on this side of the river is very difficult to be found. Since I arrived here I have met with several acquaintances, formerly fellow-students at Edinburgh, who are equally puzzled as to the best way of residing here. The worst of living

in lodgings is, that however wet the day may be, you must walk out to get every meal (except breakfast in my case, though, in general, that must be taken in a café also), often to a considerable distance; and, after trying many places and many ways, it is impossible to get a dinner under from thirty-two sous to two francs, without running the risk of eating unwholesome food.

"My daily and weekly occupations are as follows—on Monday and Thursday I have no lectures to attend, which is very convenient, as the Natural History Library and the Museum of the Jardin des Plantes are open for study on those days as well as on Saturdays. On Tuesdays and Saturdays I have Natural History and Comparative Anatomy[1] lectures to attend. On Wednesday and Friday I have geological and mineralogical classes. The lecturers here do not, as in Edinburgh, confine themselves to one hour, but lecture at will, generally from one hour and a half to two hours. I understand the lectures thoroughly, and, in general, all French conversation, but further than asking questions and expressing my wants, I cannot speak the language with any facility as yet. My difficulty lies in not being able to construct sentences quick enough, and not in the pronunciation. Several of my student friends here, however, speak French as fluently as they speak English, and one of them has just been appointed to a botanical lectureship in a college lately established at Comines in the French Pyrenees. His salary is, to be sure, very

[1] De Blainville at the Sorbonne, and Geoffroy-Saint-Hilaire at the Jardin des Plantes.

small—(between £30 and £40 a year); but the opportunity of discovery, and the facilities the district affords to the naturalist, being comparatively unexplored, more than compensate for the extent of remuneration.

"The weather here has prevented my making any geological excursions as yet; for, though warm—as warm indeed as our autumn—it has been very wet, and it is next to impossible to walk in the country in France in wet weather; but, as soon as the frost comes, I expect a rich harvest, as the geology of the neighbourhood of Paris is probably the most interesting in Europe, being peculiar and unique, and the rocks, even at the very gates of the city, abound in rare and beautiful fossils. The river has been so swollen, in consequence of the late rains, as to overflow its banks, and inundate all the lower part of Paris, so that the inhabitants of that quarter communicate with each other by means of boats. Much damage has been done, and the country beyond Paris to the west is like a great lake."

Having completed the winter course at the Jardin des Plantes, he planned a trip by Perpignan through the south of France, and left Paris at noon on the 21st of April. Of this tour there is a record in a small duodecimo note-book, each day's doings being meagrely and often illegibly jotted down, as if the writer had dashed them off in the most urgent haste with the point of a skewer.

From Paris he took *diligence* southwards by Auxerre and Châlons to Lyons, botanizing on the way when the steepness of the road allowed the passengers an oppor-

tunity to walk. Taking the steamer he sailed down the Rhone to Avignon, thoroughly enjoying the scenery of that river, which he was inclined to rank higher than that of the Rhine. In the southward journey he had noted the gradual change of vegetation, and now he exclaims, "I find myself truly in the land of the cypress and myrtle, the olive and the vine, for here they are all in profusion." Again, "Vaucluse is a singularly wild spot, and worthy of Petrarch—the rocks bare and bold, the font a miniature lake, clear as crystal and tinted like the sapphire. The water appears in a mysterious manner, as the poet would deem it, coming in quantities from the rocks without betraying its passage. There is inspiration about Vaucluse.

"There is also natural history. Plants unknown to me abound; euphorbias of many forms, many a novel species which had never gladdened my sight before, and the genus of which to me was but a guess. But there was not one daisy there."

After spending a week in the south of France, visiting the towns and other objects of interest, it had been his intention to proceed thence to Perpignan with Mr. Giles Munby, one of his old fellow-students at Edinburgh. On the morning of the 30th, however, he found, at the *poste restante* of Montpellier, a letter from his friend, announcing his inability to proceed. This wholly deranged our naturalist's plans. Whilst revolving in his mind what route to take, Dr. Lumsden, a medical student from Paris, who knew him by name, but who was unknown to Forbes, chanced to make his appearance. After a short conversation, the two travellers

made common cause, and agreed to go either to Algiers or Corsica.

Visiting Arles and Marseilles by the way, they reached Toulon, and found there Dr. Otth, a Swiss naturalist, who had been a fellow-traveller with Forbes to Avignon. He was likewise bound for Algiers, so that, on the morning of the 7th May, the three travellers set sail in company for the shores of Africa, in a French war-steamer, crowded with troops and officials. On the afternoon of the next day they reached Port Mahon in Minorca, the half-way resting-place, and remained there over night. Forbes was charmed with the novel and almost eastern aspect of the architecture, the picturesque dress of the natives, the variety of shipping in the ports, and the strange towering windmills that everywhere met the eye, each rising out of a dense thicket of cactus, with here and there a palm,—plants that gave a truly exotic character to the landscape, and were now for the first time seen as indigenous by Edward Forbes.

A night and a day on the Mediterranean brought the vessel far on her way. On the morning of the 10th, the high snow-capped range of Mount Atlas came in sight, and then slowly the coast of Algeria revealed its narrow strip of richly cultivated ground, which, ending off abruptly but a few miles from the town, told only too plainly of the wild lawlessness of the interior. Then came the port of Algiers itself, with its crowds of eager boatmen, its Babel-like confusion of tongues, its endless variety of costumes,—Moors, Turks, Arabs, Negroes, Greeks, and Europeans,—naval, military, and civil.

From the 10th of May to the 10th of June, Forbes

remained in Africa. He made many excursions through the town of Algiers, and into the territory around it, as well as eastward by steamer as far as Bougia, visiting mosques, synagogues, bazaars, cafés—Moors, Jews, Arabs, Bedouins—and never omitting, at the same time, an opportunity of noting the natural-history features of the country. They met with no adventure worthy of note, and saved their purses and their heads among the bands of Arabs whom they encountered.

On the 10th of June, Forbes left Algiers, and reached Paris on the 29th. On getting there he wrote to his father:—

"I arrived here two days ago from my southern tour, having spent more time in Africa than I intended. I returned by way of Toulon, Marseilles, the Basses Alpes, Grenoble, and the mountains of Dauphiné,—all very interesting localities to the naturalist, and in which places I made many acquisitions both in botany and zoology. At Marseilles I found the money. I was much in want of it, as I had run short in consequence of an unfortunate accident which I met with at Bougia (which place I also visited while in Africa), having lost six Napoleons in a Moorish well while botanizing, and having been at the same time in great danger of losing myself along with them. But though my voyage to Africa has been expensive, I hope it has been anything but unprofitable, since I have not only got a great stock of new specimens, but collected a number of new facts in natural history, which, when embodied into papers, will, I expect, gain me much respect from the scientific men of England.

"In point of health, I think I am much the better of my tropical tour, the climate having agreed with me perfectly, and no accidents having happened in the way of Bedouins, etc. I shall not fill this letter with particulars, as I expect to be with you myself on Friday week, or at farthest on Saturday. I shall remain here till Thursday, in order to take some notes in the libraries for my papers on the natural history of Algiers, etc., and then return by way of Boulogne and London, at which latter place I mean to remain two or three days, to call on my scientific friends there, several of whom I know only by correspondence. I have money enough by me to bring me home, and to purchase some books here which I want, and which cannot be easily procured on the other side of the water."

The scientific results of this tour in Algiers were printed in the *Annals of Natural History*, vol. ii. p. 250. In brief, he had obtained forty-five species of land and fresh-water molluscs, chiefly in the vicinity of the city of Algiers and the town of Bougia. Of these, seven species were new, and described for the first time by Forbes himself; other two species (*limax*) he did not name.

The autumn of this year appears to have been spent in his accustomed pursuits at the Isle of Man; and when winter set in, he repaired once more to Edinburgh, where he enrolled himself as a literary student.

The winter of 1837-38 is memorable in the annals of the University of Edinburgh for a series of snow-ball riots which were only finally quelled by a detachment of the 79th Regiment of foot. The defiance of all constituted authorities, more especially of the Town Councillors,

who held the anomalous position of patrons of the University, was no new thing to the Edinburgh youth. It had shown itself at intervals during the course of more than two centuries, and, at least on one occasion, resulted in bloodshed and death. In the year 1595, owing to an interference of the Corporation, the boys of the High School rose up in open rebellion, barricaded themselves in the school, and refused to surrender until their claims were recognised. The head-master supported his pupils, but he was "borne down and abused by the Council, who never understood well what privilege belonged to that charge."[1] One of the bailies named Macmorran, headed a party with the design of bringing the youths to reason by force; but after being warned off, he was shot dead by a pistol-ball from the school—a result which terrified the insurgents and brought the revolt to an end.

In October 1611, the Scottish Privy-Council thought it necessary to issue an order restraining the students of the Edinburgh College who "has taen and takes the bauldness to misknow the Principal and Regents, and to debord in all kind of uncomely behaviour and insolencies no wise seemly in the persons of students and scholars."[2] In 1680-81, the students threw the good town into not a little excitement by burning the Pope in effigy, and were shrewdly suspected of having afterwards had some concern in burning the house of the Provost.

When, therefore, in the beginning of 1838, a simple

[1] Patrick Anderson's Hist. Scot. in MS. Adv. Lib., quoted by Chambers, *Domestic Ann. Scot.* I. 261.

[2] *Privy-Council Record*, quoted by Chambers, *lib. cit.* I. 435.

snow-ball "bicker" merged into a bold and determined opposition to police and patrons, it only followed the usual course of such displays, where the customary interference of the civic authorities tends to magnify a mere academical exercise into a serious public riot. The occurrence seems to deserve notice in this Memoir, not so much from its own interest as from the fact that it kept Edward Forbes busy for some weeks, furnishing ample material for his pen in prose, verse, and lithographic sketches.

Snow had fallen thickly on the evening of the 10th January. Next morning the street in front of the College was thronged with boys and idlers, who began a short and comparatively trifling disturbance by throwing snow-balls at the students going to and from their classes. The snow-balling recommenced with greater fury in the afternoon, but it was eventually quelled, not, however, until the students had learned to expect little protection from the police, and possibly further annoyance from the populace. The following day, accordingly, the disturbance began anew; a body of police "sent for the protection of the students" soon sided with the mob, and there ensued a succession of sallies from either side, and hand-to-hand conflicts on the street and in the porches of the College, which lasted for several hours. Batons, sticks, stones, and snow-balls, were plied in all directions, many severe wounds were inflicted, more especially on the hats and heads of the police, until, at last, matters seemed getting so serious that the Lord Provost and Bailies of the town thought themselves called upon to send to the Castle for a detachment of

soldiers. The appearance of the red-coats and the bayonets soon brought the riot to an end.

In the course of the second day thirty-five students had been arrested and marched to the Police-office with singular violence and even brutality. Many, indeed, were seized who had not been engaged in the tumults, and though all were remanded to a future day, the prosecution was finally directed against five only. Six weeks passed away before a trial could be arranged; the case was at last heard in the Sheriff-Court, occupied three days, and terminated in a full and unqualified acquittal.

It need hardly be said that Edward Forbes was no idle spectator of these scenes. His long person moved about in the thickest of the throng, and, doubtless, many of the most telling snow-balls were dealt out by his arms. At one time during a rush by the police he narrowly escaped being caught. Rushing across the quadrangle to the anatomical rooms, the kindly aid of the class-servant enabled him to escape by a back-window into the street, so that he does not appear as one of the thirty-five prisoners, though doubtless quite as active a warrior as any of them.

But though he had thus failed to have his name chronicled among the heroes of his Alma Mater, he lost no time in evincing his sympathy with the captured, and he becomes as conspicuous in the movements which followed as he had been in the affray. The students finding the trial of their comrades postponed, and that matters threatened to take a more serious course than at first seemed likely, held a meeting at which a committee

was formed, with Forbes as chairman, having "full powers to retain counsel, and adopt any other means which might appear to them advisable for having the whole affair properly elucidated." And, doubtless, to the vigorous efforts made by this committee, and more especially to their choice of Mr. Patrick (afterwards Lord) Robertson as counsel for the accused, their triumph was in a great measure due. Forbes himself was especially active. It may be easily imagined that all this tumult afforded excellent material for the *Maga*, which having been discontinued for a session, had now been resumed this winter; and truly during the six weeks between the disturbances and the trial, the material was most heartily employed. The ancient enmity against the Town-Council blazed forth afresh.[1] Nothing could possibly have occurred more opportunely to show the incongruity of that corporation enjoying the patronage of the University than to find Provost and Bailies, without any concert or correspondence with the professors, after only a short interview with the students, and without any personal attempt to control and disperse the rabble, quietly sitting down to order a bevy of bayonets for the proper subjugation of the youths of whom they were the patrons and

[1] In a letter written at this time to his friend, Mr. John Aiken, Forbes says, "This session has been a most stirring one at College, the students being most active every way, both in learning and mischief. There has been some grand sport and more ability displayed than at any other session I remember. Of course, you heard of the blow-up and rebellion of the students, but you must not believe the lying reports of the newspapers. The revolt was not against the professors (who are all with us), but against the patrons, that is, the Town-Council of Edinburgh, who have the government of the University, much to the dissatisfaction of both students and professors. The thirty-seven [five] prisoners are to be tried in a week or two; the defence is conducted by a committee elected by the University, of which I am chairman, and, as far as it lies in my power, the matter shall not rest till the University Charter is placed on a better footing."

protectors. Forbes's pen held them up to weekly ridicule in the front of the *Maga*, and depicted their countenances in ludicrous caricature on the final page. The journal, indeed, breathes of nothing but "the late war," and yet its limits were far from affording space for the outburst of literary zeal. Squibs in all sorts of rhyme and measure were printed in broad sheets, and hawked about the streets. Of these, Forbes chronicles six as his own. The best of them were afterwards collected by him and one or two associates, and reprinted with a preface containing a whimsical account of the riots in the style of the old Scottish chroniclers. They appeared as a little pamphlet, under the seemingly peaceful title of the *University Snow-drop*.[1]

But in the midst of all this excitement, Forbes continued to work zealously at his natural history studies. He writes to his friend Mr. Aiken on February 8th (that is, between the snow-balling and the trial),—"As for myself, I am busy enough, though about anything *except* Medicine. My little book on the Manx Mollusca is all printed; I having corrected the last proof-sheets about an hour ago."

This was his first volume. It is merely a synopsis of species, in a little duodecimo of sixty-three pages, with three plates, and entitled, "*Malacologia Monensis*, by Edward Forbes, For. Sec. B. S., President of the Royal Physical Society, 'O. E. M.'" It was dedicated to Professor Jameson, "by his sincere admirer and attached pupil." The addition to his name of the three mystic

[1] These riots are graphically described in a letter from George Wilson to his brother Daniel. See his *Life*, pp. 119-123.

letters of the Brotherhood is eminently characteristic. At this period, and indeed up to the time of his death, when writing to any of the Brotherhood, he usually signed his name with a triangle at the end, and often began with an "O. E. M." in the corner; nay, he even requests a correspondent to "stick a big triangle" on the direction of his letters.

The summer of 1838 was spent on the Continent. About the beginning of May he crossed to Antwerp, whence he journeyed with a friend by Liege and Aix-la-Chapelle to Frankfort. He then set out alone for Vienna; but the rest of the journey is described by himself in a letter to Dr. Percy. "From Frankfort I went to Vienna, saw the lions at Vienna; went through Styria and Carniola to Trieste, seeing innumerable lions on the way, the grandest of which was the great cave at Adelsberg,—a work of nature which beats all the cathedrals in the world. At Trieste, I sat myself down to naturalize; but instead of devoting my time principally to zoology, as I originally intended, I devoted it mainly to botany, and regularly studied all the plants of that country,—a country the richest I ever met with in rare and local species. Oh, my dear Percy, thy mouth would have watered and thy fingers itched hadst thou seen the rarities of Carniola in the plant way. Nevertheless, trust that in a few months' time thou shalt handle their dry carcasses, and adorn thy own herbarium with them. I collected about 3000 specimens, and about 300 and odd species, almost all of which will, I expect, prove new to Edinburgh herbariums. I have also had the satisfaction of investigating the Polygalas and Violas

more fully than before, and confirming my British species; and I bring with me Jacquin's *Primula elatior*, a plant that never grew in Britain, and *very distinct*. I owe much to my botanical companions, Tommasini and Brasoletti, names familiar to every reader of Reichenbach or of Koch. I returned home by Venice, Milan, and the Simplon."

The British Association met this year at Newcastle, and Forbes read before it a paper "On the Distribution of Terrestrial Pulmonifera in Europe,"[1] which is interesting chiefly as it gives another indication of the early tendency of his mind towards the study of the grouping of plants and animals, and the laws by which that grouping appears to be determined. He was intrusted by the Association with the preparation of a report on the distribution of the Pulmoniferous Mollusca of the British Isles.

From Newcastle he went to the Isle of Man, where for a few weeks he "was diligently occupied naturalizing," principally among the radiata and fishes. He considerably increased the Manx Fauna, and in a letter to his intimate friend, the late Mr. William Thompson of Belfast, after enumerating these additions, he intimates his intention of drawing up a paper on the Manx star-fishes. This he read before the Wernerian Society in the following spring,[1] and thereby paved the way for his larger and more comprehensive monograph on the British star-fishes. But he found time also for his favourite amusement of scribbling squibs and verses, for he writes to his botanical friend, Mr. W. H. Campbell,—

[1] *Rep. Brit. Ass.* 1838, Sect. p. 112. [2] *Mem. Wer. Soc.* VIII.

"I have just commenced a new work, namely, 'Hookie Walker, a Philosophical Romance.' It will be decidedly the finest prose composition since the days of the Song of Solomon."[1]

In November he returned once more to Edinburgh, to establish himself, to use his own phrase, as "a winter resident in Auld Reekie," as he found the Isle of Man "very unscientific." He gave this winter a course of fifteen lectures on "The Natural History of the Animals in the British Seas," before the Edinburgh Philosophical Association. They commenced with an outline of the system of classification and its basis, and after passing upwards through the various grades of the British marine fauna, terminated with a lecture on geographical distribution, and a general summary of the subject.

By some mistake, the first lecture of the series had been fixed several days earlier than that for which Forbes was preparing; and in a letter to his father he says, "Guess my surprise when on arriving here I found my name placarded over the walls, as commencing my course on Friday the 9th (last night). It put me terribly out, as the lecture could not be put off; and I have worked from the moment of my arrival to the hour of lecture, making diagrams, drawings, and begging, borrowing, and buying specimens for the introductory lecture, as the boxes I sent to Glasgow have not yet arrived. Though greatly flurried, I lectured last night,

[1] It might be supposed that he was here only poking a sly joke at his friend; but in his place-book he has jotted down the heads of part of his "Romance." It was to commence with a meeting of the fools, Jack Pudding, Pickle Herring, Jean Potage, Hans Wurst, and Macaroni, and was to embrace such topics as "The Philosopher Fool," "Walker's Bridgewater Treatise," "Philosophical Bigamy," "The Coming Woman," etc.

I may say with perfect success, and to the entire satisfaction of my friends here, to an audience of between 200 and 300, though the night was extremely bad. Among others Professor Graham [was present], a great compliment, as the professors have hitherto made a point of staying away from the lectures. Next Friday I appear again."

Christmas, with its short weeks of relaxation, found Forbes in Fife with his friend and future colleague, Mr. Goodsir. The interval was spent as usual, "naturalizing," for even the short cold days of mid-winter yielded some material to the naturalists. St. Andrews Bay was strewn with the delicate *Cydippe*, cast ashore in a recent storm. There were two species, both new, which Forbes described shortly after in the *Annals of Natural History*.[1]

The year 1839 thus actively ushered in, saw no abatement of his zeal in the prosecution of natural history. Indeed, some of his former employments had to be abandoned, so earnestly did he devote himself to his chosen line of study. In particular, the *Maga*, which towards the end of the previous winter had closed "in the midst of splendour," was not resumed, much as its preparation had occupied and amused him. Two similar journals, indeed, had been started, but Forbes had no connexion with either. His lectures, reports for the British Association, papers for the Wernerian Society and the *Annals of Natural History*, and the close observation which these demanded, left him little leisure for other matters. "For my own part," he writes to

[1] *Ann.* and *Mag. Nat. Hist.* III. 145.

Dr. Percy (February 1), "I find one science, that of Nature, enough now, and study it with a view to the development of the laws of species, of the laws of their distribution, and of the connexion between the physical and mental development of creatures. In literature, I am as usual scribbling bad verses and locking them up. You will laugh at me, I dare say, for what you will call trifling, but I may be a poet yet, who knows."

Of the verses which he wrote in these student days, there are still enough extant to form several volumes. They are in all varieties of rhyme and rhythm, and on all manner of subjects. About the year 1835-6, not a few are "oineromathic," and celebrate the glories of the mystic union of "love, learning, wine." Of these, the following is among the best :—

O. E. M.

Hail, noblest science! light divine!
To Magi only given;
Hail! art of arts, that bears the sign,
The stamp, the seal of Heaven.
The Sun himself, although so bright,
Is dim beside this triple light.
Hurrah! hurrah for the Rosy Band,
Hurrah for the Holly Tree![1]

Though some poor canting mortals say
That wise men must be sad,
Let them come here and see the way
How wise men can be glad.
Their wisdom is but foolery,
And *ours* is what it ought to be.
Hurrah! hurrah for the Rosy Band,
Hurrah for the Holly Tree!

[1] The "Rosy Band" and "Holly" formed part of the insignia of the Maga Club, and then of the "Brotherhood of the Friends of Truth;" the "Magi" were, of course, members of these fraternities.

Man's life was never meant to be
A life of care and woe;
"Enjoy," says true philosophy,
"The days thou art below."
Heaven spreads the banquet for our use,
He sins who dares Heaven's gifts refuse.
Hurrah! hurrah for the Rosy Band,
Hurrah for the Holly Tree!

Then whilst we live we'll spend our hours
Mid all that's bright and fair;
In learning's fields we 'll gather flowers,
To wreathe in Beauty's hair,
For wisdom's hoary locks we 'll twine
A crown of myrtle and of vine.
Hurrah! hurrah for the Rosy Band,
Hurrah for the Holly Tree!

Δ

After Forbes's sojourn in Paris, he seems to have taken especial delight in Béranger, since both among his papers and in the pages of the *Maga* there occur frequent translations from that poet, as well as imitations of some of his songs. But in his student years, and for years afterwards, the bulk of Forbes's poetical effusions belonged to the amatory class, and were often of the most sentimental kind. Sonnets to many a fair one, odes to beauty, and passionate love-lorn songs, run through his note-books, and occupy endless sheets, half-sheets, and odd scraps of paper, mingled, too, with faces ringlet-shaded or braided, grave, tender, or gay. Often, on some page of dry natural history notes, an arch face, with long curls, peeps out at the corner, or tall dreamy-faced nymphs float across the leaves with arms outstretched, beckoning the limner to that land of sunny eyes, in which lay the scenes of his day-dreams.

On the 10th January 1839, Forbes wrote to the secretary of the Wernerian Society, desiring to be ad-

mitted a member. His admission, which took pl
shortly afterwards, must have been peculiarly gratifyi
to him, since his name was proposed by his reve
master, Jameson. The new associate soon showed t
he meant to carry out with zeal the ends of the Soci
The same session, as has already been noticed, he r
his memoir on the star-fishes of the Irish Sea, which
the express desire of the Society, was printed in t
Transactions.[1]

As spring wore on, it became necessary to set abo
completing the material for the Report on the distribu-
tion of British pulmoniferous molluscs, which was to be read at the ensuing Association meeting. Forbes planned his summer tour in such a way that the extreme northern and southern limits of the islands should, if possible, be visited along with Ireland. By such a circuit, together with what had been done by himself and others in the intermediate area, he judged that the report might be made "interesting, if possible, important." He begged vigorously from all his friends, and received valuable aid. To Mr. Thompson he writes, when the probability of visiting him had lessened, "as for Ireland, I must O'Connelize, *i.e.*, beg assistance from you, and anybody else you know, who can furnish local lists, especially for the far west and south-west."

On the last day of May he sailed for the Shetlands, touching at Anstruther by the way to take on board his fellow-labourer, Mr. Goodsir. During the fortnight they spent among these islands, Forbes found little to insert

[1] *Mem. Werner. Soc.* VIII.

in his report of air-breathing gasteropods, and so far the journey was fruitless; but this was to no small extent compensated by the success of his dredgings in the bays and fiords. He thus sums up in his note-book the results of the fortnight: "We have done very well, on the whole, in our visit to Shetland, especially considering how short our time has been. To add eleven or twelve new animals to the British fauna, and to see as many more exceeding rare species, confined to this locality, is no small harvest for a naturalist to reap in a fortnight, especially when it is considered that six days of that fortnight were lost, in a manner, at sea. . . *N.B.*—Must go back to Shetland." A week of similar employment was passed in Orkney, enlivened, however, by a ball on board one of the Hudson's Bay Company's ships, where, "to the music of three fiddles, the scrapers of which appeared to be somewhat elevated," Forbes "plunged into the intricacies of the dance, and kept it up till two in the morning."

He returned to Edinburgh on the 26th June, but started again on the 1st July, to join Mr. Smith of Jordanhill in a dredging cruise among the bays of the Firth of Clyde. He chronicles nothing of note in the voyage, and adds that he returned to Edinburgh on the 18th. The beginning of the following month found him at Berwick and Newcastle, collecting material for his Report from Dr. Johnston and Mr. Alder. Thence he hurried through London to Guernsey, anxious to carry out his plan of gathering evidence from both extremes of the British Isles. When his notes and papers were completed, he went to Birmingham, where the British

Association held its reunion. The papers which he read were,—1*st*, Report on the distribution of the Pulmoniferous Mollusca in the British Islands,[1] in which, after pointing out the various influences which affect the distribution of terrestrial molluscs, he divides the British Isles into ten zoological provinces, and indicates the general relations of this part of the British fauna to that of the continent of Europe. His quaint humour creeps out in the description of the region embracing the Scottish Highlands, of which he says, "climate sways the distribution in the ninth district. The hospitality of the Highlands does not extend to snails." 2*d*, Notice of Zoological researches in Orkney and Shetland during June 1839.[2] 3*d*, On the Ciliograda of the British seas by Forbes and Goodsir. At this meeting three committees were formed, in each of which Forbes took part. One had for its object the preparation of skeleton maps for recording the distribution of plants and animals. But he took still more interest in the Dredging Committee, which, indeed, owed its existence largely to his own exertions. A sum of sixty pounds was set apart "for researches with the dredge, with a view to the investigation of the marine zoology of Great Britain, the illustration of the geographical distribution of marine animals, and the more accurate determination of the fossils of the pleistocene period." His interest in the operations of this committee found vent in some verses which, though written for the next Association meeting, may be appropriately quoted here. The first three verses ran as follows :—

[1] *Rep. Brit. Ass.* 1839, p. 127. [2] *Ibid.* p. 79.

THE DREDGING SONG.

BY A MEMBER OF THE DREDGING COMMITTEE OF SECT. D.

Hurrah for the dredge, with its iron edge,
And its mystical triangle,
And its hided net with meshes set
Odd fishes to entangle!
The ship may move through the wave above,
Mid scenes exciting wonder,
But braver sights the dredge delights
As it roveth the waters under.
Chorus—Then a-dredging we will go, wise boys!
Then a-dredging we will go.

Down in the deep, where the mermen sleep,
Our gallant dredge is sinking;
Each finny shape in a precious scrape
Will find itself in a twinkling!
They may twirl and twist, and writhe as they wist,
And break themselves into sections;
But up they all, at the dredge's call,
Must come to fill collections.
Chorus—Then a-dredging, etc.

The creatures strange the sea that range,
Though mighty in their stations,
To the dredge must yield the briny field
Of their loves and depredations.
The crab so bold, like a knight of old
In scaly armour plated,
And the slimy snail, with a shell on his tail,
And the star-fish—radiated.
Chorus—Then a-dredging, etc.

This meeting is memorable for the institution of the "Red Lions," of which Forbes was the founder, and, for many years, the leading spirit. He and other young naturalists, disliking the irksomeness and expense of the ordinary, adjourned to a small tavern adorned with the sign of the Red Lion. There they dined daily at small expense, on beef cooked in various fashions, moistened with sundry potations of beer, and enlivened by joke and song—in contradistinction to the endless dishes and wines, and formality of the "big wigs." "Before the

conclusion of the meeting," says Dr. Bennett, "these dinners became so famous that the tenement could scarcely hold the guests, and it was resolved to continue them wherever afterwards the Association should meet." The sign of the tavern furnished a name for the guests. They styled themselves "Red Lions," and, in proof of their leonine relationship, made it a point of always signifying their approval or dissent by growls and roars more or less audible, and, where greater energy was needed, by a vigorous flourishing of their coat-tails. In these manifestations it is needless to say that the voice of Edward Forbes rang out above the rest, and his rampant coat-tail served as a model to the younger lions. He was wont, too, to delight the company by chanting in his own peculiar intonation songs composed for the occasion, the subjects being usually taken from some branch of science (as in the song quoted on the preceding page), and treated with that humour and grotesqueness in which he so much delighted. Of these and the "Red Lions" who listened to them, more will be said in subsequent chapters, for the meetings were continued to the time of Forbes's death, and are still kept up. Indeed, so pleasant were they found to be, that those members who lived in London, formed themselves into a Red Lion Association, and met statedly, their crest being a brilliant red lion with a long pipe in one paw, and a glass of beer in the other, and the "feeding hour of the carnivora, six o'clock precisely." The reader may perchance smile, and deem these but some of the extravagancies of youth. And yet they were zealously joined in by men who have since stood

forth as leaders in science, respected all over the world. Let no one think lightly of them who has never mingled among the students of nature and who knows, therefore, nothing of the hearty fellow-feeling which, in spite of petty jealousies, unites these men into one great brotherhood, and of the sometimes even boyish exultation with which they quit museum, laboratory, lecture-room, hill, valley, or shore, and repair from all corners of the land to compare notes in science, and to stimulate and strengthen each other by the exchange of a frank and generous sympathy. Men who spend their years face to face with nature, would be formed of strange mould if their spirits caught no measure, how small soever, of nature's freshness and exuberance. There lies an interconnexion, dimmed sometimes, but clear enough in the main, between free open creation and free open hearts; and this, when allowed to manifest itself untrammelled, is apt, sometimes, to take a form which, to the world at large, seems no way consonant with the gravity deemed requisite in the votaries of science. Unfortunately, the popular notion has had a potent influence in scientific circles, and it was largely in opposition to this kind of cant that Forbes, who hated it with his whole soul, originated the "Red Lions." And, in after years, when he had arrived at the zenith of his reputation, and British geology had conferred upon him the highest honours it had to bestow, his antipathy to men of buckram remained strong as ever. He could see no reason why a President of the Geological Society should cease to be a "Red Lion," and so he chanted his songs and cracked his jokes as merrily

as he had done in the little Birmingham tavern when he was only beginning to be known.

After the meeting at Birmingham, Forbes returned to the Isle of Man, where he remained two months, naturalizing, as was his wont. He devoted his time especially to the study of the Echinodermata, and began to contemplate an extension of his paper on those of the Irish Sea,[1] so as to form a monograph of the British species. The material for such a work had been slowly accumulating, partly from the donations of friends, but chiefly from his own researches, and in the September of this year (1839) he deemed his stores sufficiently ample to justify him in proposing to collect them into a volume. Accordingly, he wrote to Mr. Van Voorst :—

"DOUGLAS, ISLE OF MAN, *Sept.* 16, 1839.

"SIR,—Having for some time back, under the most favourable circumstances, been collecting materials for the natural history of the molluscous and radiate animals of Great Britain, most of which are now in a state nearly ready for publication, I should like to know if such would be available in your plan of publishing a series of histories.

"I am drawing up at present a history of British star-fishes, with a view to publication during the early part of next year. If it would suit your series, it is at your service. There are about thirty or thirty-five species, many of which have only been observed by myself. Drawings of all of these I should furnish, and accompany them with a series of specimens for the use of the engraver.

[1] *Mem. Werner. Soc.* VIII.

"In regard to the extent of my materials, graphic and descriptive, on this subject, on the Medusæ, and on the radiate animals generally, I believe I may take the liberty of referring you to Professor Rymer Jones. An answer would oblige.—I am, Sir, your obedient Servant,

"EDWARD FORBES."

"To J. VAN VOORST, Esq."

This offer was at once accepted by the enterprising publisher; the work occupied Forbes during the following winter, and the greater part of the next year, appearing in numbers until the summer of 1841, when the whole was completed, forming his well-known *History of British Star-fishes.*

To come more prominently before the public than he had hitherto done, formed part of a plan by which Forbes judged that his devotion to science might be rewarded with a professional appointment. It was now more than three years since he had given himself up to science, in the hope, as he wrote at the time, that it would "bring him in, before many years rolled over, some remuneration for his exertions." The success of his public lectures, and the growing confidence he felt in his powers as an expositor of nature, encouraged him to aim at any eligible chair of natural history that might fall vacant. In the meantime, it seemed needful to take up some public position which, while extending his name as a teacher, would at the same time afford him to some extent the remuneration he desired. It was with this aim he had become a public lecturer, and had "worked pretty hard," as he wrote to

Dr. Percy, "endeavouring to knock up a reputation, so as to get a chair, if possible, some day." An explanation of these views is contained in the following "plan," written on a loose half-sheet of paper, and found among his manuscripts :—

"PLAN.

"*Intention.*—To establish in Edinburgh as a lecturer on natural history and a literary man, with a view to a chair in one of the Universities, or some corresponding situation of permanent profit.

"*How to be obtained.*—By increasing my collections up to the lecturing point, so as to make them a recommendation for the class; to gather materials for commencement as soon as possible, and deposit them in rooms in Edinburgh hired for the purpose (in addition to lecture-room).

"*Immediate Prospect.*—Little or no remuneration from lecturing at first, but certainty of employment as a lecturer generally in a year or two, if successful. Also of literary employment (which is always profitable) before long.

"*Outlay required.*—On collection (illustrative specimens); books (necessary text-books); rooms (lecture and collection); occasional printing and literary speculations.

"*Annual Allowance.*"—[From his father.]

There was one professorship in particular at which he looked very wistfully. A fund had been left for the endowment of a "Chair of Chemistry, or some allied science," in the University of St. Andrews, and the

Professors were willing, and even anxious, that as there already existed a chemical professorship, the money should be applied to the endowment of a Chair of Natural History. Sir David Brewster gave Forbes every encouragement, and indeed, at one time, it appeared likely that the appointment would be made in his favour. But in the end nothing came of it.

It was to inquire into the prospects of this Chair, that on his arrival in Edinburgh, about the middle of October, Forbes hurried to St. Andrews. He found only new difficulties in the way; but to augment his chances of success in the event of the Chair being erected, he agreed to give a course of lectures in the town. On returning to Edinburgh, he thus details his prospects to his father :—

"*Edinburgh, October* 29.—I have engaged to deliver a short course at St. Andrews in November and December, eight or ten lectures, at two guineas each, which will pay my bookseller's bill. I shall then return here until the end of January, when I go to Liverpool and deliver eight lectures there. I am very glad to have any excuse for not lecturing here this winter, as there is sure to be a blow-up between the professors and out-lecturers, in which I should be sorry to be implicated. The professors and my friends here generally are very well pleased at my refusing to join the "Queen's College," as it is called. At the same time, I am on the best terms with the lecturers. It is best to adhere to the stronger party when they are in the right. I am in treaty at present with a London publisher about the publication of a work on the British star-fishes. Such a book would do me much service. My memoir on that subject, in the Wer-

nerian Transactions, which has just come out, has given great satisfaction."

It would seem from the conclusion of this extract that he had kept his own counsel regarding the forthcoming volume, and though living with his father for more than a month after writing to Mr. Van Voorst, had not divulged it until he got back again to Edinburgh, and matters appeared likely to come to a favourable issue.

His lectures in Fife commenced at the beginning of December, and another invitation having been sent to him by the Cupar Philosophical Association, he lectured twice a week there, and likewise twice a week at St. Andrews. The subject was a wider one than he had chosen for the preceding winter, inasmuch as it embraced a summary of the whole animal kingdom, and he found it necessary to expand the course into twelve lectures. From the report of a contemporary local newspaper, we learn that the series at Cupar was "extremely well attended, the audience commencing at an average of eighty, and terminating at more than double that number." The light in which Forbes regarded these lectures is well shown in a letter written at the time (December 16) to his friend Mr. Patterson of Belfast:—"My chief motive at present," he says, "is the practice of public speaking, and the combining my knowledge of particular points in zoology with a general knowledge of the whole animal kingdom. This is best done by lecturing, and as I have become a *philosopher* by profession, I think it right and fair to make philosophy contribute towards its own expenses."

Whilst thus diffusing a taste for natural history pursuits, he did not cease to prosecute vigorously his own original researches. At St. Andrews he especially devoted himself to a careful study of some of the Beröidæ, establishing some new points in their nervous structure, which had been mistaken by Dr. Grant.

On the 9th December 1839, he writes:—"DEAR PATTERSON,—The last fortnight I have been up to the ears in Cydippes with most excellent results, chiefly microscopic. In these examinations I have had the benefit of the assistance in microscopes, etc., of Major Playfair and Sir David Brewster—old eyes at looking through glasses. . . . Do write to me about our favourite subjects, and believe me ever sincerely yours,

"EDWARD FORBES △."

Towards the end of this year was founded a University Club, intended to supply a bond of union among the students of the different faculties, and between present and former students. Under its auspices an Academic Annual was published (the first and last of the series), containing, among others, essays by Samuel Brown, George Wilson, and Edward Forbes. It was here that Forbes first sketched out that grouping of the marine zones which in after years he so minutely developed. The title of his paper is, "On the Association of Mollusca on the British coast, considered with reference to Pleistocene Geology." After some general remarks on the necessity of connecting the study of fossils with that of living forms, he proceeds to divide the sloping sea-bed into four zones:—

1*st*, The littoral zone between high and low water. 2*d*, The region of *laminariæ*, or tangle, from low water to from 7 to 10 fathoms. 3*d*, The region of corallines, "the chosen scene for the operation of the dredge—an instrument as valuable to a naturalist as a thermometer to a natural philosopher"—15 to 30 fathoms. 4*th*, Region of corals, 60 fathoms.

After pointing out the effects of subsidence or elevation in mingling the fauna of the different zones, he states that the pleistocene beds, even when without extinct forms, yet differ in the association of mollusca from the shell-beds of the neighbouring seas, and that even the pleistocene, which is a subdivision of the pliocene, needs to be partitioned into a newer and older series.

The Fife lectures ended in the middle of January 1840, and the course which he had engaged to give in Liverpool began on the 13th of next month. The interval was spent at Edinburgh, writing up his notes and completing his drawings of the star-fishes, which he had promised to have ready for the publisher on the 1st March. This arrangement, however, owing to an unexpected change in the date of the Liverpool lectures, he found himself unable to fulfil. As it was, he had to deny himself much pleasant social intercourse at Liverpool, and took lodgings instead of accepting the hospitality of a friend, that his labour might be less impeded. "Every hour, exclusive of lecture," so he writes to his sister (March 9), "has been taken up writing." Yet the writing was not wholly scientific. Amid ophiuræ, ophiocomas, Luidias, echini, and cidares, he found quiet

moments when his fancy glided back into its old and long-loved channel, and bore its wonted burden of verse and song. Among his papers there is "A Round Robin from the Ladies," printed in the *Liverpool Albion*, and signed B B S;[1] and the "Editor's Reply to the Ladies of Liverpool," evidently also from his pen. To the same paper he sent one of his best lyrics—one indeed which might justify his aspiration "to be a poet yet." The following is from his own copy, cut out of the newspaper, and contains only one emendation in his handwriting:—

A NIGHT SCENE.

A night-sky over head:
  One solitary star
  Shining amid
A little track of blue—for dark clouds hid
Its sister sunlets; on its azure bed
  It seemed a sun, for there
No jealous planet shone with which it to compare.

The dark clouds rolled away,
  And all heaven's shining train
  Of suns and stars,
With the great moon, beamed forth their gorgeous light.
Where then was that fair star that shone so bright?
  Where was it? none could say,
Yet there it doubtless was although it seemed away.

So lustrous shall we find
  On earth each soul[2]
  When seen alone;
And though when brighter spirits round it press,
We lose its form and doubt its loveliness,
  Still should we bear in mind
That it is not less bright although it be outshined.

LIVERPOOL, *March* 1840.

The lectures appear to have been successful, since they

[1] In his early articles, songs and sketches, Forbes varied his initials in a most characteristic way. Sometimes he wrote B B B B (four *b's*=Forbes); or only B B; or, as above, B B S; or he altered the pun by substituting four actual bees with quizzical faces (sometimes with a pipe in their mouths) and bodies and legs thrown into the most awkward positions.

[2] "Each living soul," marginal note.

not only pleased Forbes but also the directors, who expressed a wish that he should lecture again next session. This he willingly agreed to do, as the remuneration (five guineas a lecture) was much larger than he had received in Scotland, and additional experience in public speaking he regarded as of great importance. He mentions a correspondence with some of the Manchester Institutions, relative to a course of lectures in May, but the pressure of other engagements seems to have prevented it ever taking place.

No sooner had he concluded his engagement at Liverpool than he hurried off to London, to arrange about the publication of his "British Star-fishes." The fortnight in town was a very pleasant one. He found Mr. Van Voorst ready to second his exertions, and determined to spare no expense in bringing out the volume in the best style of printing and engraving. Forbes took away with him some wood-blocks to draw with his own pencil the outlines of the ophiuræ, etc. Of this visit he thus writes to Thompson (March 21), "I have spent a very pleasant time in London, but have not done much. This is not the place for working. Paris is a much better locality for a naturalist." He received great kindness from the leading scientific men of the metropolis, and he especially records the names of Robert Brown, Owen, Lyell, Yarrel, Rymer Jones, Ward, Bentham, Harvey, and others. "On Thursday," he says, "I had a great treat in dining at Ward's, meeting Robert Brown, old Menzies, Bentham, and Harvey. We had a most pleasant dinner-party. I have seen a good deal of the geologists, and found them by no means bad fellows."

left London for Edinburgh on the 25th March, with the intention of returning early in May to see the woodcuts of his work before they were printed off. His speedy migration northwards afforded some merriment to his friends at Belfast, and he defends himself in a letter to Mr. Thompson:—"I am amused greatly at your triumph over my return to Edinburgh. True, I could not work in London: I preferred pretty women to star-fishes, and the theatre to study. Besides, want of books, actual want of books! After all, give me my lodgings in my attic in Lothian Street, in spite of my uproarious visitors. I would work well in London, however, were I fixed there in lodgings."

When he returned to the "attic," it was with the firm determination to devote every available moment towards hurrying on his work for Mr. Van Voorst. He was induced to this, not only by the desire of having the volume published at once: the British Association was to meet this year in Glasgow, all the Scottish naturalists would be there, and he felt that he could certainly take no mean place among them. It became needful, therefore, to get ready fresh papers. He had materials for several, but they were not so complete as an additional month or two of dredging and exploration might make them. Hence if he allowed the summer to slip away whilst he remained in Edinburgh, August would come upon him unprepared. Unfortunately, however, a calamity befell him which no amount of prudence could have averted. His landlady had resolved to leave Edinburgh, and so poor Forbes received notice to quit his attic, where he had been gathering together plants, sea-urchins,

shells, minerals, boxes, bottles, and scraps of paper, in short, as he called it himself, "the accumulated rubbish of four years." When the fatal truth became only too evident, he began the exodus as methodically as, in the midst of such a chaos, seemed possible. To his sister he writes, "I intend to have a sale of old clothes next week, and then distribute my goods among my friends, or else hire a room wherein to put them. Seriously, it is very annoying at present, as it delays my book."

We cannnot wonder that, under these circumstances, the young naturalist's brain should at times have become somewhat confused. "All my movements," he says to Mr. Thompson (May 13), "are floating like dreams in my brain,—Channel Islands, Ireland, Hebrides, Isle of Man, all dancing quadrilles with each other, pirouetting in turn, advancing and retreating, and then to their places. I wish I were omnipresent." The weather, too, annoyed him, for in the same letter he adds, "I don't feel well in an east wind; it blows my brains to the wrong side of my head, and confuses me." And so, by way of solace, he threatens to "do the animal kingdom in verse, sticking at nothing that is physiologically true." He began this design, indeed, by writing a few humorous verses on the habits and structure of the Holothuridæ. Happily, however, the wind and his landlady's intention seem to have changed together. He was allowed to remain peaceably in his old abode, and prosecuted his drawings and descriptions until summoned to London by an urgent letter from Mr. Thompson. He remained only a week in town, working almost without intermission at

the preparation of the first part of the "Star-fishes," and then hurried with his friend to Liverpool.

The early part of this summer seems to have been spent quietly at the Isle of Man. On the 6th of July he left Douglas, and passed some weeks in Ireland. At Belfast he found his old friends and fellow-naturalists, William Thompson and Robert Patterson, and under their guidance strolled round the neighbourhood of the town. From Belfast he proceeded with Thompson and Hyndman, by Enniskillen and Ballyshannon, to Bundoran, where with the addition of Robert Ball, they tried to dredge, but found the sea too stormy, and contented themselves with an examination of the rocks of the shore. At Westport, Lough Killery, Clifden, and Roundstone Bay they dredged, but the unfavourable state of the weather still continued. At the last-named locality, Thompson parted from the company, and travelled by land to Galway, while the rest made the trip by sea, meeting with an accident at the Arran Isles, by which the jib-boom was snapped. They arrived in Galway late at night, and found their friend in bed fast asleep. After some further dredging on the west coast of Clare, Forbes re-crossed the country, and returned to the Isle of Man, where he remained till the 9th of September, busy with his volume, and with the preparation of one or two papers for the Association. Some of these required additional dredging, but his usual success had somehow deserted him this summer. "I do think," he writes to Mr. Patterson, "the Medusæ have heard of our committee and cut, or that some mischievous anti-zoologist has written them an anonymous letter warning them of

their danger, for deuce a one is to be seen in the sea now where there were once so many! I have been doing exactly as yourself to find them. My only captures have been the common *Medusa aurita*, the *Cyanea capillata*, *C. Lamarkii*, and the *Cydippe pileus*, and even all these are exceedingly scarce this year. There is evidently a conspiracy."

It is interesting to notice the delight with which he looked forward to the ensuing meeting of the British Association, and the desire he expressed in many of his letters that he might behold a strong muster of his naturalist comrades. Any one who showed symptoms of hanging back received an earnest expostulation, warning, entreaty, or even friendly threat. William Thompson, who found himself unable to attend, came in for an especial measure of bantering; another old student-friend, who had returned from abroad, was warmly solicited to "come to Glasgow to meet them all." Wholly free from the petty jealousy of lesser minds, Forbes delighted to see round him his comrades and rivals in the race. He encouraged, aided, and advised them, or frankly told them their faults, ever binding them closer to him by the transparent openness and generous friendship of all his doings.

Although one or two of the band were absent, Forbes had no reason to be disappointed with the aspect of the phalanx of young men of science. He saw around him not a few who had entered the field with himself, and who, fighting their way upward with him, have since taken a high place. The array of leaders in science was likewise a goodly one. In his own section (of which

he and his friend Mr. Patterson were chosen secretaries), Forbes records with especial pleasure the presence of Agassiz. "We are great friends," he wrote to Mr. Thompson from Lothian Street, after the conclusion of the meeting, "and were together all the Association week." "I expect him here on the 21st October; he is to work over my species with me, so as to avoid useless synonyms."

Forbes's scientific standing was greatly heightened, both by his papers, and by the impression of the wide range of his acquirements produced by his conversation, and the manner in which he discharged the duties of secretary. The communications which he read were, 1*st*, A paper in the Geological Section, "On a Pleistocene tract in the Isle of Man, and the relation of its Fauna to that of the neighbouring sea." This was his first appearance before the geologists of the Association. In introducing himself and his subject to them, he said "that he did not appear as a geologist, but as a zoologist desirous of contributing to the progress of geology." 2*d*, On *Pelonaia*, a new genus of ascidian mollusca, a joint paper by John Goodsir and Edward Forbes. They had found two of their species near Rothesay, and one in the Firth of Forth. 3*d*, Further researches on the British Ciliograda, also a joint paper by the same authors, in continuation of that which they had read at the previous meeting.

The "Red Lions" growled, and roared, and flourished their tails again this year as lustily as before. Professor Ramsay, who now entered the fraternity, has furnished the following recollections of the meeting:—

"I dined," he says, "with the 'Red Lions' at the Thistle in Glassford Street, and sat, I think, between Forbes and Lankester. Forbes and an Irish gentleman were the very life of the party. They both made speeches replete with humour, the latter returning thanks for the health of the army, and Forbes proposing the health of that wonderful curiosity—a creature compounded of a cross between the Red Lion of England and the Scottish Thistle. He also chanted his famous song of the oyster—a style of composition which, at that time, to me had all the charm of novelty. It was with no small pleasure that I then discovered that the most promising young scientific men of the day were as remarkable for their mirth and humour as for their scientific acquirements."

When the meeting of the Association terminated (23d September) a large number of the members visited Edinburgh, to which Forbes also repaired. Among the visitors he especially welcomed Agassiz, who, as he wrote to Mr. Thompson, visited the attic of 21, Lothian Street, and "worked over the synonyms, freely telling all he knew, and confessing all he did not know. He was in ecstasies with the living urchins, star-fishes, and ophiuræ I showed him, and confessed he had never seen them alive." "He also gave in to my classification of the Echinodermata, admitting the Ophiuridæ as a group equivalent to the star-fishes, and granting that the Sipunculidæ are radiata."

The gradual departure of his Association friends, and the consequent cessation of the round of breakfasts, dinners, and suppers, left Forbes at leisure to

him of how the winter was to be spent. The St. Andrew's Chair still kept dancing like a will-o'-the-wisp before him, and about the middle of October, it seemed on the eve of decision. But ere a month had gone by, it slipped away from him, and nothing but an Act of Parliament could bring it back, by sanctioning the application of the fund to a Chair of Natural History. Nevertheless, he was told that it had been resolved to apply for such an act, so that he had still a chance of settling in St. Andrews. But he had ceased to be very sanguine in the matter, and he remarked that he should "probably have cut natural history before it was settled." The truth is, he began to weary of the uncertainty and dependence of his lot. His lectures hardly paid their own expenses. The literary employment to which he had looked forward as likely to afford some help he had found no time to undertake, and no other remunerative sphere of labour seemed open to him. His buoyant spirit and enthusiastic devotion to science had hitherto closed his eyes to the difficulties a-head, but now, as these came nearer, he found himself reluctantly compelled to look them full in the face. The result of his councils was to make one more vigorous effort in Edinburgh. "I mean," so he writes to Mr. Thompson, "to give science another chance for a year, and if there are no better prospects at the end of it I must bid it adieu."

That he was in earnest when this decision was made soon became evident by the announcement of two courses of lectures by him this winter. One of these was a strictly scientific series upon systematic and structural zoology, and the philosophy of natural his-

tory. The second course was of a more popu[illegible] It formed one part of a series of lectures on the "P[illegible] sophy of the Sciences," of which the other half wa[illegible] undertaken by the late Dr. Samuel Brown[1]—a college friend with whom Forbes had much in common. The subject of Forbes's popular lectures he called "Zoology and Psycho-zoology," terms which sufficiently indicate the general aim and tendency of his thoughts. These lectures were given weekly on the Saturday evenings, and began auspiciously with an audience of 200; but this number was due, as the lecturers soon found, rather to the fact that the introductory discourses were free, than to any strong interest in philosophy on the part of the public. "If this experiment fail," wrote Forbes to Mr. Patterson, "I don't know what to say about feeding the people. The mass bestow more kicks than halfpence on science." His forebodings were only too truly realized; on the first paying night the room showed a disheartening array of empty benches, and the lectures in the end became a failure.

The other more strictly scientific lectures were intended chiefly for students, and were given three times a week. This series, too, met with little encouragement, but Forbes went on lecturing from a stern sense of duty, because, to quote his own words, "to desert my post here, even with my two or three students, would be ruination to my character for steadiness."

It seemed as though success in the more practical affairs of life were never to be gained. Here, in the

[1] Four years after this he refers to these lectures in a letter to Mr. Horner. "I send you the prospectus of these lectures; it may amuse you by the impudence of two students putting forth such a document."

cation he had chosen, he found little but disappointment, and this was now all the more discouraging, not merely from its repetition at a maturer age, but because it met him in the path where he felt that he deserved to succeed, and which, indeed, he saw was the path for which he was specially qualified. The prospect was far from cheering. Everywhere around him he saw his old comrades settled in more or less remunerative spheres of labour; they had a definite aim and employment; some were even rising to eminence in scientific reputation, and others, far his inferiors in mental power, seemed to find lucrative appointments almost without an effort. But as for himself, he had been drifting about for five years since abandoning medicine, and now a settled home and permanent vocation appeared about as far distant as ever. Yet he had worked hard; he had botanized and zoologized at intervals from the Shetlands to the Channel Isles; he had dredged a considerable extent of the Scottish coast, as well as the Irish Sea; he had added not a few animals to the British fauna; he had dissected and studied many of the invertebrata, especially the echinoderms and some of the medusæ; he had published several carefully prepared papers and memoirs, and was at that time engaged upon his book on the "Star-fishes," and as the result of the whole, he had come to be regarded by the leading men of science as one of the most promising naturalists in the country. And yet, with this amount of work done and reputation gained, and with the earnest desire to labour still more vigorously, every avenue towards a livelihood seemed closed against him.

That a man of Forbes's sensitive nature felt keenly may easily be believed. But he preserved, nevertheless, the innate buoyancy of his spirit, and seriously though matters looked, he could inweave with them a thread of light-hearted humour. Instead of sitting down in despair at the signal failure of his double course of lectures, he boldly resolved to adventure another series for the summer months. This decision he thus communicates to Mr. Thompson (25th January 1841): "You will be surprised when I tell you that I can't go to London, as I mean to lecture in summer! May, June, and July I must be here. I do so as an act of duty, and to give the lecturing a fair trial; if it does not look well in summer, I'll adapt my brains to something else—perhaps writing plays, which is a favourite ambition of mine. . . My summer plan is to lecture thrice a week, and dredge the intermediate days, training my class to dredging and practical observation, and rearing a band of practical naturalists, who may take my place should I cut the science or my stick."

These summer lectures were undertaken partly on account of a license which, through the intercession of a friend, he had obtained from the Army Board, qualifying his lectures for the military examinations. He hoped that this recognition would attract some additional students; at least he felt bound to make use of it, and so he lectured on through the winter, with somewhat better prospects for the summer session. But he was destined to spend the summer in a very different fashion, and in a far-distant climate.

In the beginning of February, he heard from Belfast

[illegible]ficer of the surveying squadron in the Mediterranean had come to England, and was anxious, before returning to the East, to make the acquaintance of a naturalist, who would be content to share a sailor's fare for a year or two in the Levant. As soon as the desire was expressed to them, Mr. Patterson and Mr. Thompson at once suggested Edward Forbes, and they wrote to him, asking whether, if such an offer were made to him, he would be willing to accept it. The letter which Forbes wrote in reply is remarkable for its caution and forethought. He proposes seven questions, as to his fitness, the social qualities and official position of the officer, the time when his own services would be needed, and the means of transporting himself and his apparatus to the station. At the same time, he was ready, as he said, to jump at the proposal, though, of course, he could make no movement until his father's consent should be obtained. When he heard, in answer, that the officer in command was no other than Captain Graves, with whose name he had long been familiar, his determination to go was taken. "It would be the acme of naturalizing happiness," he wrote, and if matters could be arranged with the good people at the Isle of Man, he was ready to start at once. He said he never could anticipate his father's decisions, and he felt considerably puzzled to conjecture how his proposal would be received, "to enter on so complete an abandonment of his immediate occupations, as going to naturalize in the Mediterranean for a couple of years at a month's notice."

A week had to elapse before an answer could come back from the island, and part of the time was spent in

anticipation of the voyage, reading and getting [illegible] and apparatus ready. He had still part of his Star[illegible] to complete for Mr. Van Voorst; and the frequent use of the microscope produced an inflammation of the eyes, which delayed his work, and occasioned some little annoyance. In such leisure moments, he had often thought of putting together his scattered jottings and reminiscences of journeys by land and sea, natural history facts, sketches of manners, customs, and pictures of the roving, adventurous life of an enthusiastic naturalist. This winter, the possibility of such a volume had come so strongly before him, that while temporarily laid aside from the use of the microscope, he prepared to write it, and sent the first page or two to his friend Mr. Van Voorst. It was to be entitled "Rambles of a Naturalist," and to contain endless vignettes from the ample stores of his journals and sketch-books. Some of these sketches actually passed into the engraver's hands; two pages were set up by the printer, and a prospectus of the aim of the work was printed at the end of the "Star-fishes." But the volume was never written. The stir and excitement of the month of March 1841 interrupted his negotiations, and the new scenes and duties of his after-life never allowed him leisure to complete them.

The evening of the 19th February brought the longed-for letter from the Isle of Man. To his delight, and just a little to his surprise, he received not merely a consent but an approval from his father, but with some qualifications, which Edward interpreted to mean that he might expect no addition to his student's income in the event of the voyage being undertaken. This, however, would have

been esteemed a small matter, and would, perhaps, never have cost him even a moment's thought, had the journey been a knapsack-tramp like his rambles in Scandinavia, Switzerland, and Algiers. But the prospect of spending, possibly, a couple of years among navy-men, induced him to make inquiries as to how far his means would be sufficient. His student income, derived entirely from his father's purse, did not reach £150 a year. But in addition, he expected a small remittance from London for the "Star-fishes," according to agreement, and with this income he proposed to venture, under the belief that William Thompson would join him. The latter, however, hung back for some time, and his hesitation gave rise to several long and energetic letters from Forbes, showing how the journey would add ten years to their lives, afford them ample material on which to establish a reputation as naturalists, and, above all, greatly advance the cause of their favourite studies. In the end, the two friends agreed to go together, both as guests of Captain Graves, except that Forbes was "rated on the books" as Naturalist to H. M. S. "Beacon," an honorary title, on which he set a high value, from its bearings on his future prospects.

His winter lectures were just concluded, the "Star-fishes," though not published, was all in the hands of the printer, and by the second week of March nothing remained to detain him save a short visit to the Isle of Man, and another to his sister in Staffordshire. He arranged to start from Edinburgh on the 13th of the month, and was actually on his way to the coach for Glasgow, when he received a letter from Dr. Fleming,

advising him to try for the vacant Chair of Natural History at Aberdeen. Shortly before, when this vacancy became known, it was generally stated that Dr. Fleming himself had made application for the appointment. In doubt as to the truth of this rumour, Forbes had written to him, stating that if he did not try he himself would do so. Such generous candour ever met with a ready response from the veteran naturalist. He replied that he had made application for the chair, and had, indeed, been promised it, but that if any probability of a contest should arise he would withdraw, and write immediately to his young friend, and hence Fleming's letter advising Forbes to put in his claim. Before the receipt of this letter the latter had written to Mr. Thompson: "I should much like to have it [the chair], as it would place my mind at ease and render me independent of home, but I fear it is in vain to hope for it. I must just look forward to the results of the Greek expedition, and should anything turn up when I am away, I must leave a request with my friends to put in a claim for me." Though late in the field, he was not altogether without hope. Jamieson promised to support him, Fleming would probably do the same, and his friend Professor Blackie wrote to enlist the co-operation of the member for Aberdeen. Of the candidates, he scarcely feared Macgillivray. Phillips was his formidable opponent, backed, as he believed, by the whole strength of the Geological Society.

Under these circumstances, the route by the west coast had to be abandoned. Leaving Mr. Goodsir to collect testimonials from the Scottish naturalists, Forbes started by packet for London, to push matters at head-quarters,

and arrange with Captain Graves about the journey to Malta, for whatsoever might be the result of his canvass for the Aberdeen Chair, he had determined upon going to the East, and the success of his application would only prevent his wintering abroad, and bring him home to lecture in November. But in the end, the decision of Lord Normanby (for the Chair is a regius one) went against him, and the appointment was given to Macgillivray.

All arrangements being at last completed, the naturalists finally left London on the 1st of April.

CHAPTER X.

THE ÆGEAN SEA.

LEAVING London on the 1st of April 1841, Edward Forbes and his fellow-naturalist, William Thompson, journeyed by Paris and Lyons to Marseilles, whence a coasting packet conveyed them, by Leghorn, Naples, and the Straits of Messina, to Malta. This circuitous route had its advantages, inasmuch as it brought the travellers within sight of much famous scenery, while the delays at the intermediate ports enabled them to make short inland excursions, as to Pisa and through Naples. At Malta, on the 17th of the month, they found the "Beacon" ready to start, and only waiting their arrival. Forbes immediately adapted himself to his change of abode, and the same afternoon wrote home to his father that he was fairly installed in the "Beacon," and found the quarters most comfortable. The vessel, indeed, being fitted up expressly for surveying service, was adapted in every way to scientific usages, and formed in consequence a most advantageous home to a naturalist.

A fair wind on the morning of the 21st bore the "Beacon" away from Malta, but it eventually shifted, and drove the vessel into the Bay of Navarino, where Forbes spent three busy days, dipping his dredge for the

first time in the Grecian seas. It was the evening of the 6th of May before the anchor was dropped at Syra, the central port of the Archipelago.

When Captain Graves left England it was his intention to prosecute the hydrographical survey during the summer round the coasts of Candia, and Forbes anticipated a rich harvest of results, botanical and zoological, from the ascent of its snow-capped mountains. Coasting round Cape Matapan, they saw the white peaks in the far distance sleeping peacefully on the deep blue sea. But on reaching Syra they learned that these same peaks, so placid themselves, were yet looking down on a scene of wild tumult and uproar, for the natives had risen in revolt against the Turks, and bloodshed and rapine were spreading through the island; with the risk of being thus regarded by both parties as spies, and shot accordingly, it became plainly impossible to proceed with the survey of Candia.

During the uncertainty of the news from the island, the "Beacon" remained anchored at Paros, and Forbes employed himself, and likewise not a few of his naval comrades, botanizing, zoologizing, and geologizing in turn. The few weeks of his intercourse with the officers and crew had sufficed to enlist all their sympathy and assistance. "The first lieutenant," says Captain Graves, "though anxious, as all first lieutenants are, to keep the decks clean, never objected to the contents of the dredge being spread out, but almost became a convert." The captain's cabin was turned into a kind of museum, laboratory, and store-room, where the various animals brought up from the deep were dissected, drawn, or stowed away

in bottles, the captain himself lending every assistance, and eliciting many a quiet clinical lecture from the "oyster-dredger," as the sailors term a naturalist.

"It was quite amusing," Captain Graves continues, "to see how Forbes gained the good opinion of the sailors of the 'Beacon,' and how they all endeavoured to add to his collections. If a boat returned from surveying, there were always some shells for Mr. Forbes. If the seine was hauled at night, a lanthorn was always at hand when the fish were taken out, to look for *curios* (as Jack termed them) for their friend, and whether additions or not, the donor always received an encouraging answer, his present was accepted, the sailor felt gratified, and was only anxious to search after other treasures of the deep."

With a whole crew of assistants, and the accumulating results of his own explorations, there was, of course, ample scope for the microscope and the pencil in the evenings. And pleasant evenings they were when, the surveys and dredgings of the day over, the officers met in the cabin round Forbes, who, with the microscope at his eye, and a pencil in his hand, sketched the anatomy of the organisms that had been caught during the day, chatting the while, in his own simple, impressive way, about the form and habits of the creatures before them, and enlivening the description with many touches of quiet humour. Hours thus spent passed quickly away, and when at last the microscope was put up, it was only necessary to place a few scraps of paper before Forbes, to open up another inexhaustible source of amusement. "He would draw groups," says Captain Graves, "in

which we were all included as connected with our common pursuit during the day, placing himself conspicuous if anything ridiculous had occurred."

On the 6th of June, when he had been in Paros less than a month, he thus wrote to Dr. Percy : "At present I am devoting my time more to observation than to mere collecting, and I am especially occupying myself drawing all the unpreservable animals (which in these seas have been sadly neglected) that fall in my way. I have got some good work done already, having made coloured drawings of near ninety species, many of which are apparently new, and throw much light on important biological questions. I have also commenced collections in botany, geology, and various departments of zoology, which are beginning to make a show.

"My own chief object in view is to ascertain the exact relations of animals and plants to each other in these islands, so as hereafter to have a good basis for the illustration of certain points in geology and philosophical zoology, which can only be cleared up by a more precise, and, at the same time, more *generalized* observation of the Mediterranean than has hitherto been gone into."

While at Paros he roamed with two or three companions over all the island, and likewise made excursions to Antiparos and Naxia. In these rambles it was his delight to encase himself in an old shooting-jacket, full of pockets ; his long hair, surmounted by a "Jim Crow" hat, hung down his neck ; his feet were shod with a pair of primitive country boots, into which he tucked the loose ends of his trousers ; a botanical vasculum was

slung across his shoulders, and a stout hammer supplied the place of a walking-stick. Thus attired, he wandered over the hills and valleys of Paros and Naxia, dined and danced with the natives, pitched his tent on the hill-sides, dredged among the bays and islets, and plied his hammer along its shores. And though ever intent on the rocks, plants, and animals that came in his way, he had an eye too for the manners and customs of the islanders, as well as an artistic appreciation of the scenery of their isles. His letters contain numerous references to the Turkish and Greek population of the Ægean, and of both, but especially of the former, he speaks in terms of commendation. He somewhat qualifies his estimate of the Greeks, though in one letter he foretells that "they will be a great people yet, and are almost as interesting as the shell-fish that live on their shores."

Much of the transcendent loveliness with which his early fancy had invested the "Isles of Greece," was rapidly, and sometimes even rudely, dispelled by these excursions. He found a group of bare rocky islands, less picturesque in themselves than our own Hebrides, and owing their attractiveness, apart from historical associations, almost solely to the clear cloudless sky above them, and the deep blue waters that laved their shores. Yet were they hallowed scenes: their very barrenness had in it something sacred; their old civilisation was long since gone, but no new one had arisen to efface the memorials of the past. And so, as Forbes wandered, antique recollections crowded upon him. These isles and seas had for him something more than

the common interest, vivid though it be, with which every one regards them. The seas and shores around him were the same seas and shores that had yielded their denizens to the father of natural history, and now he was re-discovering those forms which, in the hands of Aristotle, had laid the foundation of his favourite science. Thus, in addition to the historical interest of the scenery, every plant on the hill-sides, every shell on the shore, every fish in the sea, had an interest of its own, and in gathering them, Forbes felt himself, in a peculiar sense, on consecrated ground. The shadow of one great name was around him, a name which, the further his own researches proceeded, he felt himself the more constrained to revere. It was doubtless with the recollection of these, his earliest explorations in the Mediterranean, that in after years he wrote:—"Who that has ever visited the borders of this classic sea, has not felt at the first sight of its waters a glow of reverent rapture akin to devotion, and an instinctive sensation of thanksgiving at being permitted to stand before these hallowed waves? All that concerns the Mediterranean is of the deepest interest to civilized man, for the history of its progress is the history of the development of the world; the memory of the great men who have lived and died around its banks; the recollection of the undying works that have come thence to delight us for ever; the story of patient research and brilliant discoveries connected with every physical phenomenon presented by its waves and currents, and with every order of creatures dwelling in and around its waters. The science of the Mediterranean is the epitome of the science of the world.

The very name of that inland sea is the text from which the sermon on all other seas must be preached."[1]

Early in June, there being still no prospect of visiting Candia, Thompson, who was sick of the sea, parted company with the "Beacon," and started for England. By this change, an additional amount of work devolved upon our naturalist, for his companion had agreed to record observations on the vertebrata, both terrestrial and marine, while Forbes himself undertook his own favourite invertebrate division. He had reluctantly, therefore, to abandon the attempt to collect the terrestrial vertebrates. Such birds as could be shot by his surveying comrades were skinned and added to the stores in the "Beacon." He allowed no reptile to escape; and with the aid of the seine and line, he continued to add to his collection of fishes. But the great bulk of his observations lay, of course, among the invertebrata, chiefly the mollusca, owing to the comparative scarcity of radiate animals in the bays round Paros.

He had now been a month in this island. He had scoured its hills, valleys, and shores for plants, insects, and molluscs, and the collections and notes which he had made represented pretty fully the flora and fauna of Paros. He was ready and eager, therefore, to avail himself of a triangulating cruise with Lieutenant Spratt among the neighbouring islands.

Their object was first to visit Naxia and ascend Mount Jupiter, to make certain observations for the Coast Survey. Starting, accordingly, about the middle of June in the "Fanny"—a boat of some ten tons, which acted as one

[1] *Literary Papers.* By Edward Forbes. London, Reeve, 1855, p. 106.

of the tenders to the "Beacon"—they passed down the Anti-paros channel, among islands of marble and slate, picked up one of the assistant surveyors on the way, and after sailing nearly round Paros, cast anchor at Naxia, in a sandy bay among promontories of granite and gneiss. One of the lieutenants was stationed there at the time, and with him they arranged their ascent into the interior. It was a short but pleasant journey. Their route lay first through some salt marshes, abounding with mud-tortoises and green lizards; the road-sides were lined with aloes, and mulberry trees, laden with fruit, dotted the fields. Some parts of the way led through labyrinthine thickets of reeds and brambles clustering around the base of some steep granitic slopes, up which the mules toiled in long eccentric procession. Many picturesque castles, once the abode of the Venetian nobles, crowned the crags. In some of these the travellers were fain to rest, meeting everywhere with great kindness, especially from a fine old Greek, who had done good service in the days of the Revolution, and who was now spending his old age quietly in a picturesque château among the Naxian hills. His son accompanied them on their journey along a richly-wooded valley dotted with villages, and encircled with steep jagged hills on every side, save one, where a gap in the chain revealed the clustering islands of the blue Ægean. Towards evening, they arrived in a village at the upper end of this valley, on the slopes of Mount Jupiter. Purchasing a lamb, they fared sumptuously, and spent the evening on the house-top gazing down the lovely dale, and watching the groups of peasants on the neighbouring roofs, where the men chatted in groups,

while the women plied the spindle. Throughout the day, Forbes had been noting the natural history features as he passed along; every halt had given him an opportunity to explore the zoology of a fountain or rivulet along with the plants which bloomed around it: both the fauna and the flora he found to resemble those of Paros. Early next morning the summit of Mount Jupiter was gained. In the ascent a few plants occurred, not elsewhere seen in the island; but the summit, though 3300 feet high, showed the same plants and shells which characterized the plains. The weather proving too misty for the observations, the party descended by the Cave of Jupiter, a large cavern romantically situated, but with hardly any stalactites. In a river close at hand Forbes was delighted to meet with his old friend, the little *Ancylus fluviatilis* along with two *paludinas*. From this point the descent lay along the track of the previous day, the travellers calling again at the châteaux, and receiving a renewal of their hospitality; while at one of them, Forbes, not a little against his will, was constrained by a Greek to prescribe for his wife. They arrived at their tents late the same night. Next day, in making some visits in the neighbouring town, Forbes was again compelled with equal reluctance to act the part of physician.

The remainder of their short stay in Naxia comprised a visit to the Emery Mines, and an ascent through valleys richly clad with vines, planes, olives, and oleanders, to the summit of Mount Zia, from which, the weather being now clearer, they could see at intervals a wide expanse of the Ægean with its islands, and, far away to eastward, the faint outline of the mountain peaks of Asia

Minor. In spite of "mel-tems"—furious winds from the north-east—which compelled them to put into lonely creeks and harbours, they succeeded in beating round Naxia, and their mission being now over, joined the "Beacon" at Port Naussa in Paros, after an absence of nearly three weeks.

After two days in Paros, naturalizing and getting the news (for letters from home had arrived during their absence), they set out on another cruise of a fortnight. Revisiting Naxos they sailed round to Serpho, Thermia, Syra, Myconi, and Delos. At Serpho they rambled among the iron-mines, now wholly abandoned, and over such heaps of slag as to suggest whether it might not be owing to the demand for fuel in Serpho that the Cyclades had been stripped of their wood. The corpse-like head-dress described by Tournefort, as worn by the women of Siphanto, likewise characterized those of Serpho ; a white towel wrapped round the head, and a white bandage strapped across the nose! The natives seemed an industrious people, and in spite of the proverbial ruggedness of their isle, they had covered its valleys with vineyards and fields, and with meadows verdant as those of green England. Land shells, however, seemed to have no love for Serpho.

Dredging down Serpho Bay, on the way to Thermia, Forbes had great success ; sinking the dredge in water as deep as 95 to 100 fathoms. • Thermia detained him only a day, during which he visited the hot springs and ascended to the highest point in the island. But the views were not striking, though he found this in some measure compensated by the abundance of the land-shells, of which there were many species.

The ramble over Delos, amid endless heaps of shapeless ruins, filled up a pleasant day, of which some meagre memoranda are concluded by a list of shells noticed on the shore and in the interior. Reaching Myconi he ascended the most eastern of its hills—a mass of serpentine about a thousand feet high, where, as in Serpho, he remarked the characteristic abundance of water-shells on the rock, and the corresponding absence of land-shells—a phenomenon not due, as he remarked, to any difference of vegetation peculiar to the serpentine tracts, for the plants of this hill did not differ from those in other districts of the island.[1] From shells he passed to the study of costumes, and marked with regret that the picturesque dress once worn by the females of Myconi was now to be seen only on the oldest; the young women had adopted a Frank dress, while the middle-aged dames blended the extremes, by fantastically combining the old dress with the new.

An unlucky "mel-tem" detained the "Fanny" several days at Myconi, during which Forbes had an opportunity of watching the operations of the sponge-divers, until the breeze moderated, and allowed the vessel to return to Paros, where, to his delight, he found that the boxes of natural history material, which had been anxiously expected for weeks, had at length arrived from England.

Before making further collections he employed himself, from the 19th of July to the 5th of August, putting up the specimens already gathered, arranging and com-

[1] The reverse of this was the case in Lycia, for there the serpentine tracts could be distinguished from those of limestone at great distances, simply from the distinctive character of their vegetation.—*Travels in Lycia*, II. 159.

pleting his notes, and bringing up the arrears which the last five weeks of busy dredging and collecting had thrown upon his hands. To his sister he writes:—"The captain having fitted up a house on shore, I have the great cabin at present to myself, and am making a sad mess of it, skinning fish and preserving specimens." Unfortunately the delay in the arrival of the boxes had prevented him from collecting plants to the extent he could have wished. While at Malta he bought a quantity of paper, but his stock was too small to admit of the preparation of many duplicates. And now, when an ample supply had arrived, the flowering season was wellnigh over, and it would have been useless to commence a systematic collection that year. To botanize the islands thoroughly, he would require to begin in April, and he looked forward accordingly to a botanical spring next year. In the meantime, he had endeavoured to make as complete a herbarium as his opportunities would allow, and the results of his examination showed that the vegetation of all the islands yet visited was exactly similar, while up to a height of 3500 feet, the highest peak he had ascended, the plants of the Cyclades yielded no trace of a sub-alpine character.

On the 5th of August another cruise began. This time the "Fanny" was replaced by the "Isabella;" a ship's launch considerably larger than the former, decked over and fitted out as a tender. The cabin, such as it was, had only sleeping-places for two, on hard lockers, while the men were sheltered under a deck forward. But the accommodation, though thus limited, was greater than in the "Fanny," and Forbes embarked

with great glee on board of what he called his floating palace. This cruise was to embrace a much wider circuit than the last; for, after visiting the southern islands, it was Lieutenant Spratt's intention to stretch across to Cerigo and the southern end of the Morea, and to be absent from the "Beacon" for six weeks or two months. In a nearly dead calm they sailed from Paros, the current bearing them slowly onwards through a glassy sea, unrippled save by the frequent plash of the dolphins that gambolled past, until, late at night, and just as the first moanings of the "mel-tem" were beginning, they dropped anchor under the cliffs of Siphanto. Two days were passed in this island ascending to its summit to make observations for the survey, visiting its monasteries and noting its geology and natural history. Land shells occurred in great abundance among the slate and marble rocks; contrasting with the marked paucity of similar forms at Serpho; indeed, Forbes remarks that they were more numerous here than he had ever seen them in any locality. A snorting breeze bore them rapidly to Nio, where they visited Homer's tomb, and enjoyed the frank and hearty hospitality of the Niotes. The wind had gradually increased to a storm that detained them four days, three of which Forbes spent dredging the bay where they lay at anchor, and collecting material for comparison with similar muddy bays of the Atlantic. They at last quitted Nio, but erelong it blew so hard that to weather Amorgo was found impossible, and they had therefore no resource but to beat about all night in a raging sea, the dangers of which they knew not, until at daybreak they

succeeded in running for shelter to Port Vathy, one of the bays of Amorgo, surrounded by high and rugged mountains. The three days spent in this island were among the pleasantest our naturalist had yet enjoyed among the Cyclades. The scenery had a mingled wildness and beauty such as he had never before seen; huge precipices plunging from the highest peaks of the island sheer down into the sea, deep ravines of limestone, the steep bare walls of which rose from tangled thickets of vines, figs, and olives, the rich colouring of the vegetation contrasting with the grey and purple tints of the rocks, and the play of light and shadow, varying with the broken outline of cliff, crag, and coppice, formed altogether a scenery which the artistic eye of Edward Forbes could well appreciate. Nor, in spite of the acknowledged poverty of Amorgo, did he find the people out of harmony with their island. In the cool evening, when returning from the rambles of the day, he occasionally encountered groups of peasants laden with grapes from their vineyards, who never passed without pressing him and his companion to help themselves from the baskets. The monks, too, delighted him. Like those he had seen in the other islands, they were gentlemanly, intelligent men, with no tinge of asceticism, but showing a generous and hearty hospitality. Under their guidance, the travellers visited the romantic monastery of Panagia, perched like a swallow's nest on the face of a great cliff. While Forbes sat sketching this strange group of buildings, a monk from the neighbouring town, who was passing at the time on his way to the monastery, begged leave to examine the drawing, and being apparently satisfied with

the powers of the artist, requested to have his likeness taken. The request having met with a ready compliance, the monk continued his ascent vastly pleased with the courtesy of the strangers. Next evening, however, Forbes and his friend were somewhat surprised, on entering the town of Amorgo, to find themselves waylaid by the same monk, who entreated them to visit his cell, where they found laid out for them a repast of fine grapes and rakee. While they were enjoying his hospitality, he proceeded to attire himself in full canonicals, and finished with an entreaty that Forbes should sketch him in colours. This too was cheerfully granted, though doubtless not without some sly joke upon the vanity of the host. In the end, however, it appeared that vanity was not the only actuating motive; the monk himself was a self-taught artist, and of some merit, as the portfolio which he pulled out very well showed. To meet with a brother of the brush in Amorgo, was an event in his life which he judged could only be fitly commemorated by having his own portrait painted.

From Amorgo, the "Isabella" steered southwards to Santorin, through swarms of the little fly-like pteropods flitting along the surface of a tranquil sea. Entering the great bay of Santorin, with its gigantic cottage-crowned precipices, shooting up from an abyss which a line of 1500 feet could not fathom, Forbes found himself for the first time in a region of recent volcanoes. Landing on Nea-Kaimeni, the voyagers scrambled up the sides of that great cinder-heap, on slopes of loose ashes and masses of lava, among which bloomed in profusion the yellow-flowered *Carlina*, so common in the

isles. In the crater, among tufts of the mountain-bracken (*Pteris aquilina*), grew some solitary fig-trees, the fruit of which was eagerly gathered. The *Statice* clustered along the banks of a sulphury pool, in which numerous boat-insects were paddling about, but no land shells could anywhere be seen. Yet the isle was not wholly devoid of traces of molluscan life, for in rambling along the shore, that glistened with the rich hues of volcanic sand, Forbes came upon a mass of pumice, enclosing a layer of sea-shells (*Pectunculi*, etc.), evidently occupying their original bed. It was, in truth, a coral bottom, such as he had dredged dozens of times in thirty-five or forty fathoms' depth; and as it lay between sheets of hardened pumice, four to six feet above the water edge, it clearly evidenced that, after a period of volcanic activity, shells and corals had spread over the floor of the sea, until their growth was checked by fresh igneous ejections, and by a final elevation of the sea-bed to at least 200 feet above its previous level.[1]

Anchorage is, of course, unknown in the bay of Santorin, which, in truth, occupies the site of an ancient crater, not yet wholly dormant, for in calms and in south winds, say the Theriotes, there are often rumblings and bubblings, and the water assumes a sulphurous hue. Sailing across this abyss to the harbour of Thera, if by that name they might designate a mere indentation in a wall of rock, which rose 600 feet above the water, and sank to an unknown depth below it, they moored the "Isabella" to the rows of white-washed pillars which in Santorin take the place of anchors.

[1] *Brit. Ass. Rep.* 1843, p. 177; Lyell's *Principles of Geology*, 9th edit. p. 443.

The exploration of this curious island occupied three days. Toiling up the steep zig-zag road, cut along the face of the precipitous cliff, they found on the summit a well-built town with a half-Frank population, beyond which lay a garden of vineyards in the finest order. What in itself forms perhaps the most barren spot among the Cyclades, had been scrupulously cultivated, and the labours of the islanders had eventually transformed the margin of a crater into a paradise. Mount St. Elias, to which, as the highest hill of Santorin, Messrs. Spratt and Forbes proceeded, to make the triangulating observations, consisted of a metamorphic limestone, rising out of the volcanic eruptions; and they were not a little interested to notice that, immediately on stepping upon this calcareous rock, they encountered land shells (*Clausilia cærulea* and *Helix* ——), which could not be discovered on the volcanic part of the island, save near the town, where the quantities of *Helix aspersa* and *vermiculata* had been introduced from Crete as articles of food. The monks who had perched themselves comfortably on the top of the mountain, were a portly, hospitable set of men, among whom lived the priest Cairi, in a kind of monastic imprisonment. Forbes spent some time in conversing with him in his cell, and found him possessed of great information and knowledge of the world, he having travelled through Italy, studied two years in Paris, and visited England to see Oxford.[1] Here again Forbes's medical

[1] Professor Blackie of Edinburgh has furnished the following particulars of this Greek. "Cairi," he says, "was a great man. He taught philosophy at Andros, and formed a school of devoted admirers. By the favour of Mr. Glaucopis, one of his disciples, I have been put in possession of some of his philosophical works, which are written in a beautiful style, and display learning,

powers were called into requisition, as all who had any ailment, and doubtless many who had none, came to him for remedies.

Sailing from Santorin in another "mel-tem," they passed a second stormy night at sea, this time with greater risk and damage, losing their jib-boom, and having a quantity of dishes broken, until they anchored in a sandy bay off Milo. The storm and fog still continuing, they quitted that island, and making a rapid voyage westward, dropped anchor in Servi Bay, at the south end of the Morea, under the high, richly-tinted cliffs of St. Angelo. Dredging among the inlets and bays of this neighbourhood, naturalizing along the shore, and ascending for about 2000 feet among the hills on the east side of the bay, comprised the sum of their six days' stay at Servi.

On the third of September they sailed to Cerigo, dredging by the way in twenty, eighty, and one hundred fathoms. Cerigo being a British island, the voyagers found themselves at home among English officers, and spent three pleasant days in rambling over the country. Among the more interesting scenes was a calcareous cave, somewhat like that of Naxia, but much finer, from the number and fantastic, often statuesque, forms of the stalactites. One of these, in the centre of the grotto, so closely resembled a worn female statue, that it required but little effort of the imagination to picture the cavern

profound thought, and sound judgment in no ordinary degree. The most characteristic trait of his philosophy, is the deep root which it has in religion, a quality which well entitles him to be called the Plato of the Modern Greeks. Notwithstanding this profound piety, however, which breathes in all his works, not being exactly orthodox according to the local standard of the Greek Church, he was persecuted as a heretic, suffered imprisonment, and died with all the honours of a martyr in the year 1852. I have little hesitation in setting him down as one of the most remarkable men that modern Greece has produced."

as a subterranean temple dedicated to the patron goddess of the isle. From Cerigo the "Isabella" paid a visit to Cerigotto, partly for the purpose of ascertaining the truth of a report that the latter island was rising from the sea. Before they landed, the truth of the statement had become clear, from the dark belt, about nine feet high, which rose from the existing sea-margin and wound along the island, following all the indentations and irregularities of the coast-line. This band seemed much furrowed, and on examining it, Forbes found twelve furrows or narrow terraces so marked, that on a steep rock on the left side of the harbour, they resembled a line of steps cut for the ascent of the rock. At a height of eleven feet above the present sea-level (as defined by *Balani*, etc.) he cut a deep score with the number eleven, and date 1841, with the expectation that the mark would serve as a test of the rate of elevation, for it appeared that the upward movement still continued.

Among the results of the Cerigotto visit, not the least interesting, was the limitation of the antiquity of the island's upheaval. On the left side of the harbour, near the entrance, there is a hill crowned with some ruins—remains of temples, baths, catacombs, and fortifications. Descending from these towards the sea, Forbes discovered a dock cut in the limestone, for launching galleys. The lower limit of the excavations ceased at the upper edge of the old sea-margin, and hence he inferred that the island had risen nine feet since its colonization by the ancient Greeks. This change of level, moreover, had operated in a most marked way on the fauna of the island, and in working out this question, we see another instance of the

readiness with which Forbes had begun to dovetail zoology and geology. "The hill on which these ruins stand," he notes, "is separated from the hills nearer the present town by a deep ravine—a water-course. Here I found a raised beach, exactly where it ought to be, according to the former height of the isle. It is now overgrown with bushes of *Pistachio lentiscus*, etc. It is composed of sand and shore-stones, mingled with *cerithium* (*sp. vulgatum* and *mamillatum*), *nassa neritoidea*, and *reticulata*, and other shells, most of which live in sand at the mouth of rivers. Now, as in the whole island there is no sandy shore on which these animals could live, a change has been operated on the fauna in consequence of the rise. These are not shells such as are eaten (there are heaps of these also, chiefly *trochus*); but must have been true natives of this locality." Other points of interest occurred while exploring the geology and natural history of this curious island, and altogether this visit was one of the most useful as regarded his scientific progress which Forbes had yet made.

Returning to Cerigo, he examined more carefully the geology of that island, especially the subdivisions of its tertiary strata, the deep gorges and cliffs affording him admirable sections. One of the most abundant fossils was the *pecten*, so abundant, indeed, as to attract vulgar notice, and our naturalist suggests that possibly the immense quantities of it in Cerigo (the ancient Cytherea) may have been the reason why this shell [?] was held sacred to Venus.[1]

The voyage from Cerigo to Milo proved long and

[1] It was the Porcellane or Cowrie that was held sacred to Venus at Gnidos.

tedious; thunderstorms, waterspouts, adverse winds, and stormy seas, all conspiring to keep the "Isabella" uneasily beating about between the islands. Nevertheless it became at intervals calm enough to allow the dredge to be sunk to depths varying from 100 to 200 fathoms, until the anchor was dropped in the great natural harbour of Milo. After ascending the hills and zoologizing along the shores of this island with no particular results, the voyagers started once more for the rendezvous at Naxos. Dredging at intervals by way of Argentera, they reached Port Naussa on the 23d September, after an absence of seven weeks, and thus ended our naturalist's third cruise in the Ægean Sea.

In writing to Mr. Thompson, three days after returning to Naxos, Forbes thus briefly sums up the nature and results of his researches:—"I have been incessantly occupied, and have made two long cruises. . . . Weather has been very bad, and we were sadly knocked about by storms all the summer, but I suffered in no way. Whenever it was possible we dredged, and the results are most important. I have found a defined fauna different from any other of the marine zones, between 90 and 200 fathoms in these seas, and an exact correspondence in its productions over all the examined part of the Ægean—a stretch of 200 miles. I have found star-fishes alive at 200 fathoms; *Tellinæ* and *Rissoæ* at 150 (!); a bed of chalk full of *Foraminifera*, and the shells of *Pteropoda* forming at the bottom of these seas! Moreover, the most characteristic shells of this hitherto unknown region, are species only known to conchologists as fossil: *I* only have seen them alive

and kicking. You can appreciate the value both to geology and zoology of the discovery of this new sea-country. We have dredged deeper than ever was done before (as recorded), but it could never have been effected except by Ball's little dredge, which has proved invaluable. Tell Ball so.

"On land, I have also found a number of interesting results, especially as to distribution, but have not done anything as to birds as yet—really from want of time, for every moment has been occupied. I have now near 200 drawings of animals by me. Everything marine has been well looked to, and no fish escaped skinning if worth it. I let no fish pass, if the kind is not in the collection. Next year I may, perhaps, take up the land animals. All reptiles are of course secured, and all coleopterous insects, of which my collection now looks very respectable."

Writing by the same mail to Mr. Patterson, he says, "The sum of results I have gathered in this expedition is most curious and interesting, and will end, I am sure, in conveying a clearer view of the Ægean Sea, considered zoologically and zoo-geologically, than any existing account of any other sea, not excepting the Irish. My deep-sea dredging has shown me the necessity of a similar course at home, and the incompleteness of our home work until such is done. But how very few of our zoologists understand these matters rightly. I almost despair of any work of this kind being appreciated in the present state of our science."

During the absence of the "Isabella," whether owing to Forbes's medical skill, or to healthy air and food, her

crew had escaped the prevalent summer malaria. But the "Beacon" had not been so fortunate. Fever of a deadly kind had broken out at Naxos, and when the voyagers returned they found all in gloom, for half the crew were invalided, and one of the lieutenants, the only victim, had died. The cheerful face of Edward Forbes was welcomed with no ordinary pleasure by the saddened circle at Port Naussa, and went far to bring back the old heartiness. For a fortnight he remained there, arranging his collections, packing and preserving specimens, making up his notes, and preparing for another cruise. By the 9th of October, the "Isabella" was once more ready. Owing to the promotion of her late commander, the master of the "Beacon," Mr. Hoskyn, received her in charge, and with him Forbes started for the coasts of Asia Minor.

In beginning another cruise, with the prospect of more continuous research in a limited area, Forbes saw that a great effort had now to be made. Although he had at intervals sent to England some of the more important results of the dredgings, he had failed to awaken that interest in his work which he anticipated, and which he knew it deserved. He had looked for help from the British Association, but in vain; his researches received commendation, but no assistance. The Geological Society, more fully impressed with the value of such data as he was collecting in the Ægean, had voted him the balance of the Wollaston Fund (£30), and with this sum, and as much of his own, he began to meditate an excursion to Egypt, and a dredging expedition down the Red Sea. In the meantime, however,

he had arranged to accompany Mr. Hoskyn, and dredge the Gulf of Macri with critical exactness, registering the depths, and increasing the number of observations, whilst his companion was employed in the same boat with the soundings. The cruisings of the past summer had enabled him to discard many of the notions with which he had been impressed, in common with other naturalists, as to the zoology of the Ægean; and the new facts he had gained, though slow of attracting attention at home, were nevertheless of the highest importance. They came up one by one in harmony with his observations among the seas of his own land, and thus the philosophical views which had been gradually dawning upon him at home received a rapid development. He felt sure that they were true, and this was enough to urge him on, for the "oineromathic fire" still burned strongly within him. He knew, too, that ere long their value could not fail to be fully recognised, and he therefore set sail for Asia Minor with increased determination to work.

The "Isabella" sailed from Paros on the 9th of October. Her course lay by Patmos, Cnidus, and Rhodes to the Bay of Kalamaki, on the south coast of Lycia. The voyage, short as it was, proved full of interest, for it enabled Forbes to spend a day or two among the picturesque streets of Rhodes, and (what he valued still more) to set foot in Asia. Speaking of the visit to the port of Cnidus, he writes:—"This was my first step into Asia, and to a naturalist all was promising. Instead of the dearth of insects, so disheartening in the Grecian isles, coleoptera abounded under every stone, and on

each heap of cow-dung. New shells, too, gladdened me, and several pretty plants."

As the first part of the survey operations was to fix certain points on the mainland of Lycia, Forbes had an opportunity of visiting the ruins of Xanthus, and many other ancient cities, ascending the mountains of Massicytus to a height of about 9000 feet, and naturalizing through a country till then unexplored. The route followed by the travellers is indicated in Mr. Hoskyn's paper,[1] and the botanical, zoological, and geological results of the tour were combined by Forbes with those of a later journey, and published in 1847.[2]

The second object of the visit to Lycia was to complete the hydrographical survey of the Gulf of Macri. From the beginning of November till the 24th of the following month, Forbes continued his dredgings among the bays and islands of that part of the Mediterranean, the great depth of the water (sometimes 230 fathoms) at a short distance from land offering a new and curious field for observation. The weather proved unusually tempestuous; he had, therefore, frequent occasion to remain on shore, and busied himself with the geology of the neighbourhood, and especially in detecting the changes of level of the coast line, and in tracing the progress of recent marine formations.[3]

At the harbour of Macri he had likewise an opportunity of studying closely the fauna of the littoral zone, thereby adding some important facts to his previous notes.

[1] *Geograph. Soc. Jour.* XII. 152.

[2] *Travels in Lycia.* By Forbes and Spratt. Vol. II. See especially p. 129, *et seq.*

[3] *Ibid.* II. 188, *et seq.*

Blending natural history pursuits with the exploration of cities that had been lost for centuries, sketching tombs, temples, and theatres, mingling among the peasantry, and prescribing now and then for their ailments, sometimes benighted amid briars, ruins, and jackals in the wild uplands of Lycia, and well-nigh wrecked among the rocks and skerries that fringe their shores, these three months in Asia Minor formed no uneventful period in the life of Edward Forbes. The storms and dangers by which it was marked may, perhaps, have had some share in making it eventually a pleasant retrospect, but the main source of gratification to which it gave rise arose from the completion of his Ægean researches. The dredge now seldom brought up anything new; he seemed to have exhausted the treasures of that classic sea, and he had done so in a way in which no part of the ocean had yet been examined. Much that he had previously only been conjecturing now received the verification of facts; much, too, that he had not even conjectured gradually took definite shape, and there eventually emerged that philosophical outline which appeared in his Report on the Ægean Sea, and which raised him to a high rank among living naturalists.

Before tracing his further progress, let us glance very briefly at some of the scientific results of Forbes's cruisings in the Mediterranean. It will be remembered how early he had begun to subdivide the British seas into zones of depth, characterized by distinct assemblages of animals. This bathymetrical principle of classification was also applied by him, with singular success, to the

Ægean. He found that the latter sea could be subdivided into eight provinces of depth; first, as around his own native islands, came the littoral zone, which, from the feebleness of the tides in those seas, did not exceed a range of two fathoms. The second region reached from 2 to 10, the third from 10 to 20 fathoms below the sea-level. The fourth region ranged down to 35 fathoms, the fifth from 35 to 55, the sixth from 55 to 80, and the seventh from 80 to 105. Each of these zones showed a marked and peculiar assemblage of living beings, and could even be further separated into sub-regions. The eighth region included all the space explored below 105 fathoms, and embraced a depth of 750 feet. It was an unknown tract—a new sea-country now added by Edward Forbes to the domain of the naturalist. In the lower zones, the number of species gradually diminished as the dredge sank towards the abysses. From 230 fathoms below the sea-level—the greatest depth Forbes reached—he drew up yellow mud with the remains of pteropods and minute foraminifera, and occasionally a shell. From a comparison of his observations, he conjectured that the zero of animal life would probably be found somewhere about 300 fathoms.

One of the most important results of these researches was the discovery that those species which have the greatest vertical range, are likewise those which extend over the widest areas of sea, and hence that the range of a species in depth is commensurate with its geographical distribution. Another interesting and suggestive law of marine distribution, not hitherto proved,

was clearly established by these observations. "The assemblage of cosmopolitan species at the water's edge," says Forbes, "the abundance of peculiar climatal forms in the highest zone where Celtic species are scarce, the increase in the number of the latter as we descend, and, when they again diminish, the representation of northern forms in the lower regions, and the abundance of the remains of *Pteropoda* in the lowest, with the general aspect of the associations of species in all, are facts which fairly lead to an inference, that parallels in latitude are equivalent to regions in depth, correspondent to that law in terrestrial distribution which holds that parallels in latitude are representative of regions of elevation. In each case the analogy is maintained not by identical species only, but mainly by representative forms; and, accordingly, although we find fewer northern species in the faunas of the lower zones, the number of forms representative of northern species is so great as to give them a much more boreal or sub-boreal character, than is presented by those regions where identical forms are more abundant."[1]

The bearing of these conclusions on geological speculations he readily perceived and applied. Their value, too, was soon admitted when he explained them to the British Association at Cork, and much of his scientific work in after life consisted in working them out more fully in their application to the present and past races of plants and animals in Britain.

On the 23d of December the sounding-lead was dipped for the last time, and on Christmas eve the

[1] *Report of the British Association*, 1843, p. 130.

"Isabella" entered the harbour of Rhodes, on her way to Athens to rejoin the "Beacon." On reaching Rhodes, however, the voyagers learned that Captain Graves had just been there, and left word for the "Isabella" to join him immediately at Macri, whither he had gone with Mr. Fellowes to arrange the removal of the Xanthian marbles. This unexpected event changed Forbes's whole plans for the winter, and brought him back again into Lycia among the scenes of his former explorations.

He rejoined the "Beacon" at Macri on the 29th of the month, and found Captain Graves on the eve of starting on a visit to Xanthus, where Mr. Fellowes, with a party of seamen, was engaged in excavating the sculptures. For two months, Forbes continued with Captain Graves, making excursions in the south-west part of Lycia, among the sites of ancient cities, and through the wild scenery of Mount Cragus. During this period Xanthus presented a lively scene; sailors working enthusiastically among the ruins, and natives gathering in wondering groups to watch the discovery of the buried treasure, which, according to oriental belief, lies concealed amid every assemblage of ancient ruins. By the end of February, the operations were considered at an end; between seventy and eighty huge cases lay filled with the relics of ancient art, and the excavating party returned to the "Beacon," leaving behind the Rev. Mr. Daniell, Lieutenant Spratt, and Edward Forbes, who had resolved to make an exploratory journey through Lycia.

As a full narrative of this three months' tour was published by Messrs. Spratt and Forbes, it need hardly

be more than referred to here.[1] Their route lay over plain and mountain, and among the ruins of ancient cities, the sites of which had been lost for many centuries. Skirting the southern shores of Lycia, and ascending the valleys, which there open out towards the sea, they visited the chain of cities from Xanthus to Phaselis. Thence they journeyed by the route of Alexander's army,[2] through the defiles of Mount Taktalu and Climax into the plains of Adalia, and, following still the march of the Macedonian hero, ascended the mountain pass of Termessus, where, to their great delight, they discovered the magnificent remains of that city, four thousand feet above the sea. Descending into Milyas, they explored part of the route of the Consul Manlius, by the marsh of Caralitis, and through the richly-watered Cibyratis, gaining at last the district previously visited by Messrs. Hoskyn and Forbes. After a traverse of the mountain-ridge which separates Cibyratis from the plain of Almalee, they returned to the valley of the Xanthus, and so back to the shores of the Mediterranean at Leveesy, near Macri.

They had thus traversed Lycia twice; first along its southern maritime border, and then through the mountainous region where it merges into the neighbouring provinces of Pisidia, Pamphylia, and Caria.

The country was alike new to the geographer, the antiquary, and the naturalist, and the journey, therefore, proved one continued source of delightful excitement. Hardly a day passed without revealing traces of ancient

[1] *Travels in Lycia.* Two vols. 1847.
[2] See Forbes' *Natural History of European Seas*, p. 57.

art, the site of a lost city, or scenery at one time of softest beauty, and anon of wildest grandeur; while over and above all the ordinary interest of such a journey, the frequent change of level and soil, now among low alluvial valleys, now among the bleak, bare peaks of snow-covered hills, afforded admirable scope for the observations of a naturalist who had set himself to determine the geographical distribution of the plants and animals of that part of Asia Minor, and to attempt the elucidation of its geological structure. Such was the task which Forbes had proposed to accomplish. How he succeeded he has shown in the second volume of his *Travels in Lycia*.

Beyond the stray facts gleaned from the natives, he could obtain little information relative to the wild animals and birds of Lycia. No opportunity, however, was lost of searching for land and fresh-water mollusca. These can easily be collected with tolerable completeness during such a journey as that of our traveller through Lycia, and, as he well knew, they form a much better basis for arriving at correct ideas of the zoological distribution of a province than the few specimens of animals of a higher grade[1] which he might chance to procure. Of insects, he collected a considerable number, among which were many forms of an alpine or sub-alpine character, distinguishing the general assemblage from that of the Greek Isles, though as a whole it formed part of the great Mediterranean province.

Notwithstanding that the season of the year was not the most favourable for investigating the vegetation of Asia Minor, Forbes's botanical notes form the most com-

[1] *Travels in Lycia*, II. 71.

plete and valuable part of his sketch of the natural history features of that region. Grouping the results of his tour with Mr. Hoskyn in early winter, and with Messrs. Daniell and Spratt in spring and early summer, he found that the vegetation naturally arranged itself into four zones or regions, ranging in succession from the maritime plains and valleys up the mountain slopes to the great *yailahs* or table-lands of the interior, and thence to the higher peaks which rose from six to ten thousand feet above the sea. The flora varied not only with the height, but in a marked manner with the changes of rock and soil, so much so that the geology of the country could often be determined at almost any distance by the strongly-defined characters of the vegetation.

The geological results of the Lycian tour possessed considerable interest. They showed the extension into that part of Asia Minor of the great fresh-water pliocene series of the Mediterranean, below which occurred in a few localities an older marine group of marls, while in Cos another marine series of later date was found to rest directly on the denuded edges of the fresh-water beds. There were thus—1*st*, A miocene marine formation, sparingly visible in Lycia, resting on the old *scaglia* or Apennine limestone; 2*d*, A vast fresh-water group, of older pliocene age, lying unconformably on the former; and, 3*d*, A newer pliocene marine group, which reposed unconformably against the second series, and in its imbedded fossils corresponded with the later tertiaries of Rhodes and Sicily. But perhaps the most valuable part of Forbes's geological observations is contained in his details of the tertiaries of Cos, and his well-known

account of the remarkable gradations in form there exhibited by species of *Paludina* and *Neritina*, arising, as he showed, from successive changes in the physical character of the area in which these forms lived. His observations upon the recent geological phenomena of the coast of Lycia likewise deserve attention.

For three months the travellers had heard no tidings from England. Leaving Mr. Daniell, therefore, to pursue his antiquarian researches through other unexplored tracts of Asia Minor (in which, alas! he soon fell a victim to the epidemics of the country), Messrs. Spratt and Forbes embarked for Rhodes, where letters were waiting their arrival. The vessel to which they committed themselves was a crazy Turkish caique, with an old Turk, a stout Arab, and two little boys, by way of crew. After a passage of three days, during which they narrowly escaped shipwreck, they reached Rhodes, and found the long-expected budget of home news.

The intelligence which Forbes received was partly of an unfavourable, partly of a highly-encouraging kind. His father had met with losses which rendered it impossible for the son to receive any further remittances from home. Yet as a counterpoise to these sad and disheartening tidings, Forbes found opening up to him at last the prospect of independence. Congratulations and encouragements—the latter consisting not of words only, but including a liberal pecuniary assistance—came from the British Association, while some of his friends, especially his former fellow-student, Mr. Goodsir, were busy canvassing with every prospect of success, for his appointment to the Chair of Botany in King's College, London,

then vacant by the death of Professor Don. He could have wished the chair had been a natural history one, for he felt diffident of his botanical acquirements, and even alleged that nothing but the absolute necessity of obtaining some remunerative employment would induce him to accept a lectureship of botany. To Mr. Thompson he wrote, that by dint of exertion he might perhaps be able to give a fair average course of lectures, "and if I had that chair," he adds, "it would be a pretty certain step to Jameson's afterwards. Therefore I hope you and my other friends will back me. Settle in London I must, and live by my wits. Tell me in your next what is thought of my applying for the King's College Chair."

This diffidence was characteristic of the simple, truth-loving mind of Edward Forbes. In actual fact he possessed a large amount of botanical knowledge, and a capacity for original botanical research of no common kind. And this became clear enough when he gave his first course of lectures next summer. But he had not devoted himself with the same ardour to botany as to zoology; and hence, in the former, still more than in the latter, he felt himself far below his own high standard of proficiency. Nevertheless, the chance was one he could not allow to pass. The Natural History Chair of Edinburgh he had long fixed on as the goal of his ambition, and to this every move he made bore especial reference. His previous exertions as a lecturer we have already seen were unsuccessful, and still more so his attempts to gain a professorship in Scotland. But now the possibility of obtaining a Chair

in London seemed a more hopeful prospect than any which had hitherto appeared. His friends at home were many, zealous, and influential; he looked forward, therefore, with sanguine expectations to the next spring, when he hoped to commence his career in London as a professor in King's College.

In the meantime, something still remained to be done in the East. The council of the British Association had voted him £60, which was subsequently increased to £100, to be expended in comparing the fauna of the Red Sea with that of the Mediterranean. He had been anxious to visit the Red Sea, and had even resolved at one time to make the attempt at his own expense. But the cost of such a journey proved to be considerably higher than he had anticipated, and he was compelled to abandon the idea. The long-expected grant from the Association, however, revived it. His dream of dredging down the Red Sea seemed almost realized; he would start for Egypt, spend two months in the explorations, and still be able to return to England by the middle of winter.

Such were the plans with which, after a pleasant week in Rhodes, he started with Lieutenant Spratt in a little caique to rejoin the "Beacon." But they were doomed to be sadly frustrated.

On the second day of the voyage, Forbes was seized with fever. Contrary winds drove the frail bark out of its course, and lulls kept it still out at sea. For eight miserable days he lay in the bottom of the boat, without medical advice or comfort of any kind, beyond what his fellow-traveller could improvise from the scanty

resources of a caique. It seemed well-nigh a hopeless case; day after day rolled wearily away, and still no progress could be made. The patient grew weaker as the voyage lengthened, and his friend, in an agony of suspense, watched in vain for a breeze. At last, on the ninth day, came the breeze so ardently prayed for, and the vessel gained the port of Syra, where, by good chance, the "Isabella" happened to be at the time. After some delay, permission was obtained to put that vessel in quarantine, and Forbes was removed on board. Skilful medical treatment, and the kind attention of his old friends, all down to the youngest sailor only too anxious to please him, speedily restored the invalid to health. He used to say, however, that had he remained two days longer in the caique, he should never have left it alive.

On the 26th June, while in quarantine, on board the "Isabella" at Syra, he wrote a long letter to his father. He was then recovering, but the handwriting is very shaky. Yet his zeal seems to have been in no way impaired by the fever; for, after stating his prospects as to the Botany Chair, he goes on to speak of the Association grant, and the necessity of his going to Egypt. With a hand that appears to have been hardly able to hold the pen, he writes, "Of so great importance to my future welfare do I feel the undertaking of the task to be, that I shall make every exertion to do it, and to Egypt I must go. Two months will do the work." And all this is narrated to the length of two full pages, before he goes on to tell, as a much less important matter, that he is just recovering from a fever that had

well-nigh cost him his life. "At present," he continues, "I am recovering rapidly, but it will take a month's quiet living on board the 'Beacon' before I shall be myself again." But Edward Forbes never was himself again. His constitution, though healthy, was not strong, and at this time it received a shock from which it never afterwards fully recovered.

The "Isabella" sailed in a short time for Port Naussa in Paros, where the "Beacon" lay, and there, among his warm-hearted friends, our naturalist speedily rallied. The preparation of notes and specimens furnished an easy and pleasant in-door employment in the cabin of the "Beacon," and before many weeks had slipt away, the convalescent was able to resume his old occupation of dredging in the bays and botanizing among the hills and valleys of Paros. Such were the employments which occupied the months of July and August; they imparted new life to his weakened body, and inspired him with an earnest desire for the labour and risk of another journey. The bright vision of a dredging-boat on the Red Sea had now, however, again grown somewhat dim, for a new calculation had only served to heighten the expense. The grant of the Association would be insufficient even for the mere scientific part of the expedition, and the state of his family affairs forbade him to look for fresh assistance from home. Greatly against his will, he found himself compelled to contemplate the probability of his having to decline the grant. It almost seemed as if the intermittent fever which had lately attacked his physical frame, had now somehow settled down upon his hopes and plans. They

underwent some change on the arrival of each mail, even to the extent of an entire reconstruction, and for some months this alternation, along with the uncertainty and suspense as to his prospects in England, continued to annoy and disconcert him. Though once more active and energetic, his friends saw with anxiety that he was far from having regained his former vigour. Captain Graves in particular urged him to return to England; a step, however, which Forbes was very loath to take, until he knew more of the results of his application for the Chair, and of the grants of the British Association. When therefore, in the middle of August, news came that the Association had increased its grant to £100, and that his prospects as a candidate at King's College were highly satisfactory, he no longer hesitated as to the Red Sea expedition, but availed himself of the "Beacon's" trip to Smyrna about the beginning of September, with the view of adding to his natural history stores and observations in that part of the Archipelago, and starting thence for Egypt. From Smyrna he writes to Mr. Thompson (September 9th), "The £100 of the Association determines me to take Egypt on my way back, and I shall start for Alexandria soon, regulating my movements so as to be in England in the early part of January. . . . At the present moment the cabin table is covered with jars of salt-water, and dishes full of the dissected members of a beautiful Rhizostoma." But again his plans were frustrated, and the African voyage finally abandoned.

While lying in the Gulf of Smyrna, he received a letter from his active friend, Mr. Goodsir, urging his

immediate return, in order to secure his success at King's College, and through that the fulfilment of his ultimate aims. The arguments employed were too strong to be combated. Reluctantly abandoning what had so long been a cherished prospect, Forbes prepared to return to England. The steamer "Iberia" was to sail the first week of October, and the interval was employed in packing up his specimens, all of which he brought home with him. All the bottles, paper, and other materials that had not been used, he left on board the "Beacon;" "as I can assure you," he wrote to Thompson, "there are active naturalists there now, on whom we can depend in future. I retire from office proud of having reared them, as I feel sure the introduction of the breed into the Navy will eventually be of great service to our science." Without writing to any one in England, and after bidding adieu to his friends in the "Beacon," he set sail, and arrived in the Thames on the 28th of October.

Before entering upon the details of Edward Forbes's career in London, it may be well to review very briefly his scientific progress during the period which has now been described. This can the more fittingly be done, since the close of his Ægean expedition marks also the completion of a distinct portion of his life.

When he left Edinburgh for the East, he had spent nine years more or less under the shade of his *Alma Mater*, with his master Jameson and many of his earliest student companions still around him. The Museum and the libraries were familiar haunts; every

valley and hillside of his neighbourhood had been botanized; every lake and stream had been searched for mollusca. The Firth of Forth had been dredged from end to end, as the stalwart fishermen of the coast could readily testify; and other parts of our seas had been searched, far away among the Shetlands and the Hebrides, as well as over the Irish Sea, and round the wild Atlantic bays that indent the western shores of Ireland and Scotland. As the result of all this home research, and of the explorations which, from Edinburgh as a centre, had extended into many foreign lands, there had gradually been dawning upon him certain philosophical views, which were afterwards worked out and embodied in his best known memoirs. As yet, indeed, they existed only in the bud, but they needed nothing more than the fostering influence of a larger experience to expand them into all the fulness of leaf and flower.

Edward Forbes was essentially a biologist. Even in his earliest years, when his mind hovered bee-like over the wide domain of nature, he estimated with rare sagacity the limit of his range. Into the territory of physics he never trespassed, save now and then as an amateur in search of the beautiful, either in physical law or in organic form and colour. At College his unrestrained and diffuse explorations had to be methodized, and his tastes, equally botanical and zoological, taught to exert themselves in special channels. The great influence of Jameson, indeed, could not fail to inspire his more enthusiastic pupils with a love for minerals and a respect for mineralogical geology. Forbes soon became

passionately fond of mineralogy,[1] but he never studied it for himself, either chemically or mathematically, and so soon as he removed from the influence of his master, the love for minerals waned. But the training he had received, proved of essential service in his after life, by imparting a regard for lithological evidence in geological research, and an ability to use it only too rare among palæontologists. He became eventually a geologist of a high order, but it was through the biological, and not the physical gateway that he approached geology.

During his medical career, though careless in his attendance on the purely medical classes, he was assiduous in his devotion to those of natural history and botany. As the preceding pages have shown, he verified the subjects of the lectures by personal observations,—collecting radiata, mollusca, and insects (some of which he carefully dissected), and botanizing for many miles around Edinburgh. When the College sessions ended, and he was left to the guidance of his own inclinations, we can clearly see, from the mode in which he spent his holidays, what were to him the most attractive fields in nature. His earlier rambles, beginning with that to Norway when he was eighteen years of age, were in the main botanical. From the first they had reference, however, not to the structural or physiological characters, but to the geographical distribution of plants. This, indeed, continued through life to be his chief point of connexion with botany, though afterwards it became greatly widened by being linked with the consideration

[1] The passion was revived in after life, when he returned to Edinburgh, to take the place of his master Jameson, and found himself once more amid that rich mineralogical collection which had so attracted him in his youth.

of geological changes. In his student days he knew comparatively little of organic geology, and certainly never practically applied his knowledge of living forms to the elucidation either of extinct organisms or of former physical conditions. He rambled abroad to collect plants for his herbarium, and to mark how they are associated in nature, and what reference the changes in their mode of grouping bear to those of the grouping of invertebrate animals.

It was not until his first visit to the Jardin des Plantes, in the year 1835, that the geography of plants began to give way to the geography of animals. He seems to have left the Parisian museums deeply impressed with the value and the necessity of wide and accurate research into the distribution of the mollusca. This is evidenced not only by his copious notes from Ferussac, Draparnaud, De Blainville, etc., but more directly still by the fact, that in leaving Paris for Switzerland, and travelling among the Alps, he devoted especial attention, not so much to the botanical zones, as to the range in altitude of the pulmoniferous mollusca.

From this time, botany occupied a gradually decreasing share of his attention, and though the new fields of observation which were presented to him, first in Styria and Carniola, and afterwards among the islands of the Ægean, called forth, as we have seen, all his old zeal for flowers, it was only for a time. The scientific memoirs and papers of his later life bearing on botanical subjects, though eminently original, resulted not from fresh researches in botany, but rather from the introduction of well-known botanical facts into geological speculations,

or of a geological element into the elucidation of botanical problems.

His devotion to the study of mollusca increased yearly, from the time of his first visit to Paris. When he returned to the museums there, for a more lengthened sojourn, in 1836, he acquired fresh knowledge and augmented zeal in the study.

In Algiers, it was the land and fresh-water mollusca that attracted him, and when he returned to his own country he began immediately to set about the preparation of a list of the Manx mollusca, which resulted in his *Malacologia Monensis*. Next year he read before the British Association a paper on the distribution of terrestrial pulmoniferous mollusca in Europe, and this gave rise to his Report on the Pulmonifera of Britain.

In all these researches, it will be observed, that while he by no means neglected the preparatory study of the structure of the mollusca, it was their distribution in space that more especially interested him. He loved to trace the gradations of molluscan life, from the sea-margin down into the depths, and to mark how it was likewise grouped upon the land into distinct provinces from the sea-margin to the mountain-tops. His bathymetrical researches in the Ægean first placed this subject in a clear light. They bore practically, too, upon geological speculation, and formed his earliest important contribution in aid of the progress of geology.

During his student years, however, he devoted himself enthusiastically to careful and original researches in systematic zoology. It was almost wholly in the invertebrate division that his labours were conducted, and of

that division chiefly among the radiata and the mollusca. His papers on the medusæ and the star-fishes, as well as several contributions to malacology, show that he possessed powers of discrimination, and of the perception of analogies, such as placed him in no mean rank among scientific observers. His researches among the British Asteriadæ, particularly deserve remark. His classification was a great advance on that branch of zoology, raising the *Sipunculidæ* into the ranks of the *Radiata*, and placing the *Ophiuridæ*, to use his own words, "as a group equivalent to the star-fishes." His papers, in conjunction with Professor Goodsir, also contributed largely to lay the basis of his future fame as an accurate and philosophical observer.

Of the zoological work accomplished by Edward Forbes, during his residence in the East, as we shall see in the subsequent chapters, only a small portion was published, and the greater part has thus been lost to science. The results that bore upon the distribution of animals, and tended to link zoology and geology in a closer union, were alone embodied in his Report on the Mollusca and Radiata of the Ægean Sea, presented to the British Association.[1]

It was during his life in Edinburgh, and his sojourn in the East, that he accomplished most of his purely zoological work. The memoirs in this branch of science written by him in after years, sprang, to a large extent, from these early researches. Hence in viewing Forbes as a zoologist, we must in justice to him remember that his zoological career was almost wholly confined to the

[1] See *Ante*, p. 299.

period preceding his twenty-seventh year. The course of his after-life was thrown into other channels, and only fitfully, and almost as a kind of by-thing, could he find time for those zoological and purely natural history pursuits that occupied so large a portion of his time at Edinburgh and in the Levant. He availed himself partly of his own early work, partly of that of his friends and contemporaries, to form the basis of broad generalizations or of striking and eminently beautiful hypotheses.

There is another field of inquiry in which Edward Forbes during his student life loved to indulge, and in which some of his favourite speculations were conducted. He himself called it Psycho-Zoology. Unfortunately there exists no other record of his early views on this subject, than that contained in the syllabus to his course of lectures in conjunction with Dr. Samuel Brown. Part of this syllabus, in which we can detect the germ of some of the views which he subsequently elaborated, may be appropriately quoted here.

"PSYCHO-ZOOLOGY.

The study of life and intellect as illustrated by the study of the animal kingdom.—Preparation of the world for the reception of living beings—Relation of organic and inorganic matter—*Life not the result but the cause of organization*, the term *life* an expression of the presence of the animating spirit—Distinctions of animal and vegetable life—Threefold constitution of the animal organism—Substance, Form, and Intellect.

Development of Form.—Doctrine of the progression of forms—Relations of form to substance and intellect—Progressive complication of organization—Distinctions between the analogies and affinities of animal forms—Regularity and irregularity—Parity and imparity—Polarity—Metamorphosis—Number considered as an element of form.

Development of intellect—Doctrine of the progression of intellect

—*The animating principle*—The passive animal intellect—The active animal intellect or understanding—The combination of both in man with the angelic intellect or reason—Instinct and sagacity considered and referred to the understanding—The intellectual powers of animals briefly considered parallel between the development of Form and Structure and that of Intellect.

Views of Naturalists, Metaphysicians, and Physiologists on Psycho-Zoology—Metaphysical Natural History systems—Comparison of linear, dichotomous, circular, and irregular systems.

Man considered as an animal—The races of men—Correspondence of physical and intellectual characters in men—Relations of the mind to the structure and functions of the body—Geographical distribution of man compared with that of other animals—Influences of natural history causes on that distribution, and on the social conditions of man—Influence of the structure, fauna, and flora, of a country on the opinions and habits of men, and on the formation of character national and individual—Application of such considerations to moral and political science—Influence of the study of natural history on man's mind, in Science, in Literature, and in Art.

Prospective view of the benefits to be derived from the study of Psycho-Zoology—Moral of Natural History—Humility and Faith.

Amid the patient gathering of facts relative to the distribution of plants and animals, Edward Forbes found in geology the bond that was to link these facts together into a symmetrical whole, and in carrying out this line of research, he probably did greater service to geology than to any other branch of the natural sciences.

It was from the biological side, therefore, that Forbes entered the geological ranks. In his explorations of his native island, he had been struck by the arrangement of shells in a raised beach, and in dredging the neighbouring sea he found a shell-bank, which if elevated above the sea-level, would present, he could not doubt, an appearance exactly like that of the raised beach.

He soon perceived that the thorough investigation of the mutual relations of zoology and geology would yield a rich harvest of results. He viewed these relations as twofold, 1*st*, Geo-Zoology (or Palæontology), which dealt with the zoological characters and relations of fossil animals, and 2*d*, Zoo-Geology, which embraced the study of animal conditions, and of the associations of living animal species as illustrating those of extinct forms and the geological strata containing them. Among the influences affecting the distribution of animals and plants, he regarded as of primary importance, climate and geological structure, the secondary influences being the physical features of the country, its wood and water, and the agency of man. But though he admitted oscillations of level to be a cause of the modifications of the organic productions of the sea-bottom, he had not yet perceived how closely geological changes of climate, and of the relative level of sea and land, could be connected with the present distribution of a fauna and flora. There were fallacies in the reasonings both of zoologists and geologists, and these, he said, could only be eradicated by combining their common studies, in other words, by the study of Zoo-Geology.

It was through zoology that Edward Forbes became a geologist, and amid the engrossments of his London life it was in the main through some of the many geological avenues that he returned to zoology. And in thus passing and repassing between these sciences, he opened up many pathways through the intervening debateable land of palæontology, clearing away the entanglements that had hedged up the biological sciences on the one side, from

the non-biological on the other, and making the communication between the two regions surer and easier and pleasanter than it had ever been before. This was the great work of his life during the period on the details of which we are now about to enter.

CHAPTER XI.

LIFE IN LONDON, AS CURATOR OF THE GEOLOGICAL SOCIETY, AND PROFESSOR OF BOTANY IN KING'S COLLEGE.

THE close of Edward Forbes's sojourn among the Grecian seas was also the close of his life of unfettered liberty. Hitherto the liberality of his father had freed him from the need of working that he might live, and he had therefore striven to live, that he might work. Free to choose his pursuit, and free to follow it as he chose, or leave it when he liked, the liberty of youth had, in his case, run further into manhood than it does with most men. And though he had felt the necessity of obtaining some remunerative employment, and as we have seen had laboured most anxiously to that end, it was rather because he longed to be independent than because he feared to be in want. But more than this, whether he succeeded or no, he had never suffered anxiety about his home circle, and the consciousness that his ill success could not involve any of the loved ones in the island, had made him light-hearted when everything seemed to be going against him in Edinburgh. But matters had sadly changed during the nineteen months of his absence. His father, hitherto prosperous as a trader and banker, had lost everything, and Edward now

himself charged with responsibilities and duties which he had little dreamed of only a few weeks before. To solicitude for his own livelihood was now added anxiety for the lot of those who had the greatest claim on his love and labour.

It was only when he reached this country, and actually saw the state of his family affairs that the truth stood out in its full proportions. But no sooner did he perceive the urgent necessity for exertion than he plunged into the vortex of London life, with a vigour and a self-denial beyond all praise. For ten long years from this period, he remained the servant of others, doing mill-horse drudgery at one time, groaning under the endless trammels of Government routine at another, and only able at intervals to take up, as a secondary matter, the original natural history work which he so loved, and which he knew so well to be his own proper field of labour.

The "Iberia" arrived in the Thames on the 28th of October 1842. The quarantine arrangements detained her for several days at Stangate creek, and during this vexatious delay Forbes wrote to his friend and publisher, Mr. Van Voorst, to know what had been the result of the application for the chair in London. The return of the post brought the intelligence that he was now Professor of Botany in King's College. Writing to Mr. Thompson, immediately after the receipt of this news, he says, "I have this morning received the very satisfactory answer that I have been elected at King's College. This is very gratifying to me, as I was uneasy lest I had lost all chance of it by my absence. Regarding arrangements

about lectures, etc., I as yet know nothing, but [illegible] I shall not be called upon till spring, and have plenty to do in the meantime. . . . Much of my plans must, however, depend on what I find my financial prospects are, when I inquire in town and hear from my father." When at last he reached London, he found his financial prospects gloomy enough,—less than £100 a year from the professorship, and no help from home. To eke out the sum to an amount sufficient for his support in London, it would be needful to embark in a series of literary enterprises, furnish reviews and articles for the periodicals, and engage in any hack-work that could be got. True, this would make sad inroads on the time which should be given to the arrangement of the vast mass of natural history material collected in the East. But stern necessity would admit of no compromise.

It was while revolving such plans, and cataloguing the botanical museum of the college, preparatory to his lectures, that an event occurred which contributed materially to alter the tenor of his life. The collections of the Geological Society of London were superintended by a Curator appointed by the Society at the salary of £150 a year. The duties of this office, besides the guardianship of the museum, included also the editing of the Society's Transactions, the curator being the chief scientific consulting head of the Society's establishment at Somerset House. The appointment had just become vacant by the resignation of the veteran geologist, Mr. Lonsdale. An angry dispute had arisen in the Society as to the claims of the new candidates, a dispute so serious, indeed, that some of the foremost leaders had intimated their

ting the Society if a certain one of the s elected. In these circumstances they to young Forbes, begged him to stand, and assured him of success. Under other circumstances, he would at once have declined the offer, for he knew the sacrifice of time it would require. But the salary decided the matter, and under the auspices of Murchison, Lyell, Fitton, Taylor, and other leading Fellows of the Society, he agreed to become a candidate. His doing so he "believed was a God-send to the Society, as it in a great measure relieved both parties of their difficulties." Referring to these proceedings, he remarks in a letter to Captain Graves, "I took no part myself, neither canvassing nor asking anybody to support me, and when I was asked to send in testimonials as all the other candidates had done, I refused at once, as I considered that mode of doing things all humbug." He thus balances the advantages and disadvantages of the post in a letter to Mr. Thompson, headed, "19 A, Golden Square, London," but without any date. "The advantages are these, in the *first* place, A salary which, under my present circumstances, is an object to me; 2*d*, A good library at my disposal; 3*d*, An opportunity of studying thoroughly the fossil invertebrata; and, 4*th*, A personal communication daily with the leaders of science in London, and a reputation in the most popular, most influential, and most numerous body of admirers of science in England.

"On the other hand, I shall be tied down to daily attendance in the Society's rooms for eleven months in the year, have the greater part of my time taken up with the business of the Society, and have little or no

time to work up the immense mass of [illegible] have at hand, and which nobody can use [illegible] them in order. If I could afford to do without [illegible] would not take the office; but as my professorship will not bring in £100 a year, and as I have no other resources to depend upon at present, I *must* take what I can get, and give up working at science for the mere sake of science, for, between the mechanical work of preparing my lectures, and the work of the Geological Society, I can see no time for other things, unless a few hours snatched to fulfil my engagement in writing the 'Rambles.' The prospect is therefore a dreary one, but must be put up with. Everybody here is very kind and attentive, and all urge me to bring out the results of my late travels; —all fine talking, but of no use, until Fortune's wheel takes a turn more in favour of science than it ever did yet in our *free* country. Accordingly, for the present no Ægean Nat. Hist. or Prodromus is in the oven, since there is no oven to put them in. I shall remain in town till the Geological election is over. If I get the place, I shall go to Edinburgh for a week, and pack up there; if not, I shall go there for the winter. In the meantime, I shall be fully occupied making a list of the botanical preparations in the King's College museum, in order to see what I shall want additional for my lecture. It is too bad: nobody will write a notice of the 'Starfishes' in the *Annals*. 'Tis not I care about it, but on Van Voorst's account I wish it. Is a book to be passed over because it is a good book? Do you or Patterson give him a lift. He laid out much money on that book, and I fear it will not repay him for a very long time.

[redacted] publish invertebrata if his books are to [redacted]out comment, because the subject is not generally understood. . . . I have become a petitioner at the Linnean. I begrudge the expense, but as King's College professor I must do so, or it would do me harm. The other day Robert Brown told me he approved of my election, and that if I came to see him, he would give me advice. I take this from his majesty as a compliment." Again, in another letter to the same friend, written on the day previous to the decision of the geological curatorship, when his chances of success were tolerably secure :—"Having the office will enable me to live in London. £150 is the salary (no doubt small enough for the work), but if they get richer they will probably increase it. My chair may be counted as £100 certain (I am £60 in hand as it is), and I hope to make it worth more, as King's College is going ahead fast. £50 more by odds and ends will make £300, which will enable me to have good rooms in town, live comfortably, and make an annual excursion to the Association, and among my friends. If they build a new hospital for King's College (and they talk of doing so), the whole may turn out even better than the Edinburgh Chair, as students are very few there at present; chairs worth £800 a year seven years ago, now not producing £300. On Saturday I go to Edinburgh for ten days, when (if installed) I must be back to take office."

His visit to Edinburgh, though short, was full of pleasure, both to himself and to his wide circle of friends there. Dr. Bennett, in referring to it, writes: "We shall not easily forget the pleasure we then experienced

in looking over the rich portfolio of drawings with him. Water-colour drawings, sketches and chalk of eastern landscapes, marine views, temples and ruins, groups of Turks and Greeks, picturesque costumes, comic incidents, mingled with sketches of plants, shells, fishes, and other objects of natural history, —the whole forming a characteristic medley, indicative of the character of his observations and skilful method of treating them."

The main object of his visit to the northern metropolis was, of course, to arrange the removal of the books, specimens, and other household gods which had been for years accumulating in his "happy den," as he called it, at the top of the stairs in 21, Lothian Street, and which, when starting for the East, he had allowed to remain in Edinburgh. During his stay in the north, his election in London was confirmed. "I believe," so he wrote at the time to Mr. Patterson, "the geological matter is settled in my favour. When I glance over the heaps of work I have to do, I almost wish I was disappointed; but needs must."

Another object in visiting Edinburgh, was to arrange with Mr. Goodsir regarding the anatomical dissections of some of the Mediterranean stores. To Captain Graves he writes, 1st January 1843, "I have made preparations for commencing 'Illustrations of the Zoology of the Ægean Sea,' according to our plan. The Goodsirs are making splendid dissections of the animals. When I have the drawings, etc., of a part prepared, I shall then see if [Captain] Beaufort can get assistance [from Government] for its publication."

[redacted]d of December he returned to London, [redacted]n the duties of Curator of the Geological Society to which he had been triumphantly elected. His previous sojourns in the metropolis had been short, and occupied chiefly in visiting his friends, or ranging through the treasures of the museums. On the one recorded occasion (*ante*, p. 259), when he went to town with the avowed intention of working, his signal failure in the attempt called forth, as we have seen, the merry taunts of his Belfast friends, though he consoled himself with the reflection, that if he were fixed there in lodgings, he certainly would work. Nevertheless, he was fully aware that, to a naturalist of his temperament, London could never be a fitting place for study. Only the necessity of making science yield him a livelihood, and the consciousness that nowhere could he better seek for this than in London, had induced him to settle there. It was with the full persuasion, therefore, that he must expect rather to do the work of others than his own, and to find only short and fitful intervals for the prosecution of original research, that he returned to London as a permanent residence.

But even his gloomiest prognostications fell far short of the reality. The constant hurry and bustle of the first week after his installation was, of course, regarded as the recognised ordeal through which every public servant must pass, until his experience becomes enlarged, and the curiosity of the public has somewhat abated. But the lapse of weeks brought no diminution in the demands upon his time and labour; nay, the more he toiled after leisure, it seemed to fly the farther away. This is

brought out with a melancholy graphicness by Mr. Thompson. Under date January 6, 184[illegible]

"DEAR THOMPSON,—Pardon me for my negligence, but one of the greatest evils of my present position is the run it makes upon almost all my time. I have now put off answering your note two days, in hopes of getting to the British Museum about the hare,[1] but in comes one 'big-wig,' and then another, and then some F. G. S. would ask 'a little question about a few fossils,' and then the *Athenæum* is waiting for the abstracts, etc. etc. etc., so that my hours from eleven to four are run away with entirely, and, before I can get out of Somerset House, the other museums are shut up. You are aware the Zoological Society's collection is boxed up and unconsultable in an old warehouse. Will next week do? The first spare hour I will run up to the Museum (if possible on Monday), about *that are!*

"About your book on Irish vertebrata, etc., publish by all means, and at full length. I differ altogether from Patterson about the length. My rule is, *short* in the *Annals*, and *long* in the volume. The shorter a paper is the better, and the fuller a book. I have not had time yet to read your latter papers on birds, but will by and by, and tell you what I think. Draw up the Report for the British Association by all means. It need not be so special as that on the vertebrata. A general view is what is wanted. I expect to be at Cork, God willing, and will do all I can to help you."

Again:—

"DEAR THOMPSON,—Time! time! time! no time

[1] Mr. Thompson was at this time investigating the identity of the Irish hare with the *Lepus variabilis*, or alpine hare of Scotland.

[redacted]thing! You say I'm lucky, but you [redacted]ourself in being able to work at what you like, and at *your own work*. I have put off day after day answering your letter, and now the end of the week comes, and it must be put off till next week. I have not been able to get to the Museum, even to deliver a letter from Johnston to Baird yet, which I have had in hand two weeks. I don't know how the Mediterranean work is to be got over, and, as to my lectures, I have not had time to touch them yet. I wish to God somebody would leave me £300 a year, and then I would keep my professorship and work out my work; but, as it is, I see no prospect."

A few days later he writes again :—

"GEOL. SOC., *Monday, Feb.* 6, 1843.

"DEAR THOMPSON,—You mistake me, if you fancy I find fault with my work and amount of occupation; what annoys me is that, under such circumstances, all the original matter I have collected must lie dormant. The honour of Britain is concerned in the matter (is not that a fine idea); for, in the meantime, whilst I am making abstracts, and writing catalogues, etc., some rascally Frenchman will sift the Mediterranean, and claim the glory for his own country. You so far off can scarcely form an idea of the mass of material I have collected when with Graves. One point, however, must be done; that is, the general Report on the Mollusca and Radiata for the British Association. I wish you were here to lend me a hand, for then we might sift out the zoophytes, sticking both our names after the new species (which, I expect, will be not a few), and thus get over

work in double quick time. You [illegible]
and work; I promise you lots to do; [illegible]
look at the hare yourself. I am ashamed to say that I have not been at the Museum yet, but the fact is, it won't do to leave this between eleven and four (my hours), as the Council people drop in continually. I did intend to return you Rossmässler[1] at once, but have changed my mind, unless you are in a hurry for it; for, in case you come up soon, I will keep the land and fresh-water species of mollusca for joint description also. Without co-operation I can do nothing as things go. Searles Wood itches after the zoophytes, and Rymer Jones also; but it won't do. You must come and do this with me as prior claimant. I am surprised at and regret much what you say of ——. I suppose some evil wind of bad fortune has blown him from his business. Far better, however, do anything than turn man of letters in London. The last of the chairs went to Webster, and at best they are worth but little. I fear I over-estimated the value of mine when I said £100 a year. The Scotch chairs are better, but there is none for which he has a chance. I wish I was well enough off to share my places with him. But literature and science are at a pecuniary discount in England. There are crowds of men of letters on the town in London, just *not* starving and no more. It is a very bad look-out at best. Unless a man can take the top of the tree he is wasting his time and health in climbing. All the fruit grows at the top; there is nothing but spines on the trunk and lower branches. Could not

[1] Rossmässler's *Diagnosis Conchyliorum terrestrium et fluviatilium.*

[redacted]s mercantile knowledge, get a situation in [redacted]irm here, and then his leisure hours might help, when given to his pen; otherwise, at his age, he is about to run a sad risk. If I hear of anything that will suit or help, I will write you, and, at any rate, will look sharply out, but fear much.

"I am surprised at what you say about ——, he certainly seemed rather a rough diamond, but at the same time straightforward and open. May it not have been only a *pen* roughness which dictated his note to you? By the bye, Taylor has been at me every other day for the last two months, to let him put my name among the myriad editors of the *Annals*. I have not given in yet, and have objections, but one argument in favour will I fear overturn them, viz., living here is so much more expensive than living in Edinburgh, that I must save all I can in the way of buying books, and joining him will get me the *Annals* for nothing, and a share of the books sent to them. All I should have to do is what I do now, be a reference for papers sent in."

Two days afterwards, in a letter to the same friend, he again refers to this project of inserting his name as one of the editors, and to Thompson's zoological papers sent in for publication in the journal. "As to the papers in the *Annals*," he says, "I think they are, if anything, too full for a monthly journal. They are just the right thing for chapters in a book, but a journal is only taken up for consultation, and the consulter requires his results in as brief and compressed a form as possible. For my part (but I do not mean to set my opinions up against everybody else's), I object to popular papers in a journal, un-

less they be pure generalizations. I like to [redacted] *tabulated* or summed up in such a way that [redacted] the whole at a glance, almost without reading, descriptions of structure of course excepted.

"Your review of the 'Star-fishes' makes my modesty shrink from appearing in the title-page of the *Annals* till next volume, but in the meantime I hope I am exercising some salutary control, to Taylor's great apparent comfort.

"Yesterday the Geological Society's dinner came off. Lots of butter, of which I got a share, and as —— was the plasterer, it of course fell thick. I know the value of all such too well. . . . A short summary of the geological and zoo-geological results of the Ægean expedition rather astonished the audience, who had no very distinct idea before how much had been done. Warburton is our new president. He is rather austere, but just, and I rather want a strict man at present to keep my ribs in order.

"You talk of the Fine Arts. I came out the other day as artist, my sketches being exhibited at the 'Graphic' with considerable success. You have no idea from my old attempts what a landscape painter Daniell made me. I rather dread local societies for the encouragement of art, and trust you will exercise no indulgence in your position as patron at Belfast. An artist is not worth encouraging *professionally* unless he exhibits high powers of both hand and mind, otherwise he is only another sacrifice at the shrine of poverty and discontent. Beware!—Ever most truly yours, EDWARD FORBES."[1] △

[1] The Triangle of the Brotherhood of the Friends of Truth, still, and for some years afterwards, when writing to any oineromathic correspondent, formed an indispensable part of his signature, sometimes, however, so hurriedly dashed off, that none but the initiated could detect its form, lurking in the curving lines wherein he enveloped some of the letters of his name.

leisure which he could snatch during the spring, was sedulously devoted to the preparation of his lectures, and occasionally to the dashing

The above sketch was drawn at a Council Meeting of the Geological Society. Forbes, as usual, was busy drawing gnomes, nymphs, and caricatures, when a discussion arose on a proposition by Dr. Mantell, that the bones of the Dicynodon, in the Society's collection, should be properly cleaned and dressed. Stopping in the middle of a sketch, Forbes instantly drew on another part of the page the above representation of the Dicynodon, as his conception of how the creature would look when "properly cleaned and dressed."

off of a squib for the *Literary Gazette*, or a page of gossip for his long-advertised, but completed "Rambles of a Naturalist." On the 11th of February he wrote of these employments to Dr. Percy:—"I have sadly little time for anything else except preparing for my lectures in summer. I mean presently to make application to you for contributions to our *herbarium* at King's College. I have presented all my collections, both botanical and zoological, and am anxious to get all I can for them. A set of duplicates of European grasses, or of ferns, if you have any to spare, would be very acceptable at present. Send me anything. I have no scruple in begging, as it is in a public cause.

"The first page of my 'Rambles' is in the press, and the wood-cuts in progress. I wish I could etch like you, my ideas would flow better. S—— is here, and is, I think, improved since I last saw him. He is the same fellow, now sad, now gay, by turns, but I need say nothing on that point, for I have my own alternations of both merriment and melancholy."

But the claims of the curatorship were not the only source of hindrance to the preparation of his lectures, and the arrangement of the Eastern materials. In the short space of one month, he suffered from two sharp, though happily short returns of his Lycian fever and ague, which incapacitated him for work, and left him much weakened in body. On March 5th, he thus writes to Mr. Thompson: "I am now better of my late return of fever, which pulled me down a little, and I hope in my new residence to enjoy better health. Since I came here I have been living at No. 24, Marylebone Street, Golden

mfortable lodgings, which I could
in case you want any when you come
here. Want of room for my books, etc., however, made me unsettled, so I have changed my plan of living, and have taken up my quarters with a friend, Dr. Day,[1] a young Cambridge physician, and formerly a fellow-student with me in Edinburgh, of very great talent, and a good fellow. He has married a young lady, whom I knew in the Isle of Man, and has taken a house in Southwick Street, Hyde Park (far end of Oxford Street), where I put up yesterday, agreeing to live with him. This will both be pleasanter, and more conducive to my studies. Day's books and mine together will make a pretty good library for home use. It will also be more economical, which is an object, as living in London is a different thing to living in Edinburgh; and being

a Professor costs more than being a student. From Day's, I shall have a pleasant walk here across the parks every morning, which will do me good in fine weather. . . .

"How long I shall require your aid, one can't well

[1] Now Professor of Anatomy, etc., in the University of St. Andrews.

say till we begin to work. Suit y
coming, but do let us get a sight of y
ciation meets. May will do well.

"—— throws his drawing-room open, with microscopes, 'big-wigs,' wise men and fools tastefully interspersed, and gives them ices, sweets, and sherry before they go home.

"If you ever see the *Literary Gazette*, Jerdan printed a squib of mine in the last number."

Ten days afterwards, in view of the meeting of the British Association at Cork, he writes again to the same constant correspondent:—

"Geological Society, London, *March* 14, 1843.

"Dear Thompson,—In order that I may not mislay your note, or forget your queries before answering them, I sit down, the moment after reading your note, to write in reply.

"My arrangements about the Association and Dublin are not yet made, nor can they be for some time. In London I must be till the end of July, on account of my lectures, and I suspect I must go to Cork straight in order to gain time for the preparation of my Report. To Dublin I shall certainly go, either before or after, and thence to the Isle of Man, to see my relations. But as yet, this cannot be fixed for certain. Nothing is certain with me except that I must lecture here in summer, though when or how I am to get ready my lectures seems the more puzzling the nearer the time comes, as the work at the Geological increases every day, and other things I must do to make ends meet. The fact is,

[illegible]t deal too much on hand without the [illegible] of reducing it. When I am in Dublin, I shall certainly make it my object to examine critically the collections of shells there. I want your assistance in my Ægean collections, not so much for eye-work as for critical work, in regard to species, whether described, and where, etc. I am so stuck down in my geological room that I cannot get five minutes a week for consulting books elsewhere, or looking over collections, except at night when all the public ones are closed.

"I have catalogues of the British marine molluscs up to the time I left England, but where they are I know not, and I have no time to look for them at present. If I had spare time, I would make one according to my idea of what it should be, and print it somewhere.

"You did —— injustice in a former letter, in reviling him for spending his life in jokes. He wastes his talents in a different way—doing all the business (no little work) for the Zoological Society. He should leave that for ordinary men. Henry Goodsir has just written me saying he has succeeded in watching the development of Balanus, from egg upwards, more completely than has yet been done, and that, *at a particular stage, its larva is identical with that of ordinary crustaceans.* This complete observation must settle all question as to the positions of the Cirrhipedes."

To his much-loved friend, George Wilson, he occasionally found time to write a hurried letter, generally craving news from Edinburgh, and especially about the Brethren, rather than giving information regarding his

own doings. At this time Dr. Samuel [redacted] war with the chemists on the subject of his transmutation experiments, and Forbes, who loved him as a thoroughly congenial spirit, battled stoutly for him among scientific circles in London. In his letters to George Wilson, our naturalist frequently referred, in most energetic language, to his sympathy with Brown.

Thus, with a prelude of three interlacing triangles, as symbolical of the Brotherhood, he writes :—

"3, Southwick Street, Hyde Park, *April* 6, 1843.

"My dear Frater,—I take much blame to myself for not having written to you for so long a time, but plead guilty to having put it off from day to day. The continual hurry in which all my movements are involved here is singularly unfavourable to epistolizing, but the great craving I have for another letter from you has obliged me, in spite of all the stones in the Geological Society, to sit down and scribble. By this time I hope your health and spirits are in a better way than when I saw you in Edinburgh; ere long, doubtless, you will be able again to lecture and exercise a class.

"Many thanks for your long and most interesting letter on the subject of Sam Brown's discoveries,—all success attend them! The sooner he brings them out the better. I am the only believer here, but of course I have not whispered the process you communicated to any one. Day and I talk over it by ourselves. Tom —— is here, much improved by his travels. I had a note from Lowe proposing him as a *frater*; that must be

brethren in Edinburgh. Many Edinburgh men are excellent fellows out of Edinburgh, but sad masses of prejudice when at home. It must be seen how Tom will be when once more under his paternal roof. Yesterday I met Giglioli in the street. We took a walk together, and had a long chat. I hope to see more of him. He looks well as ever.

"John Goodsir won't write. Do stir him up to put pen on paper. He is as bad a correspondent as myself. What has been done about Dobbie's[1] business? and give me all other news about the brethren. I am over head and ears in work, as my lectures come on in a month, and I am rather behind in preparation, but must make the best of it."

"*Nov.* 15, 1843.

"I introduce the subject [of Dr. Brown's controversy] everywhere by the following process:—Men who are chemically inclined talk to me of the relations of chemistry and natural history; I reply by asking them for chemical light on the following question:—

"How do you account for certain so-called simple bodies being found only in the oldest formations, and others in only the newest or newer? That which is present in a stratum must be either there by an act of creation, or be derived from some previously existing body; but if that which is present be not identical with any previously existing body, or a combination of any two or more previously existing bodies, and yet be not admitted as a new creation, it must be a transmutation.

[1] An Edinburgh engraver of great talent, who had engraved the symbolical head-piece prefixed to the printed formulas of the Brotherhood.

[Now, it seems to me that the idea of tra[redacted] certain original inorganic forms, or even of [redacted] multiplicity, is a simpler idea than that of repeated acts of creation of inorganic bodies.

"Now I admit the repeated creations of organized beings, but in all such, the *material* of these organisms was derivative; the '*creations*' bearing reference to the appearance on earth of an *animus* limiting the matter, by which its appearance was made manifest, differently from any limitation of matter which had resulted previously from the presence of a prior *animus*.

"Moreover, the organic and inorganic world, being in a relation of polarity with each other, no argument can be drawn from the former as to the probability of successive creative acts in the latter, but rather the contrary.]

"All that I have marked in red ink[1] is perhaps too obscurely transcendental to weigh with every one, without such an exposition of the system on which it depends, as cannot be given in a hurried scrawl such as this.

"But tell me what you think of the previous question. When I put it here, men become puzzled, and Day and I both answer it in Brown's favour.

"At present I shall arrest my letter; perpetual hurry and work breaks up my corresponding time sadly. I long for such tranquil, merry, *philosophical* days and nights as we used to spend in Lothian Street.

"How are all the Brethren? Adieu!

"E. FORBES."

[1] The paragraphs within brackets.

He joined the Linnæan Society,[1] and read before it a paper on the Ophiuridæ of the Ægean Sea, which was published the following autumn in the Transactions of the Society.[2]

It was only by dint of the most strenuous labour, that on the 8th of May he found himself ready to begin his botanical lectures. The inaugural discourse was devoted to botany considered as a science and as a branch of medical education,—a thoughtful, suggestive essay, written in a singularly quiet style, yet with traces of that fanciful conception and that deep love of analogy, so eminently characteristic of the mind of Edward Forbes. In the earlier paragraphs he divides the natural history sciences into three—zoology, botany, and mineralogy—and adds that geology formed the exposition of the mutual connexion of the three. To quote his own expressive words, geology "may be looked upon as the history of the earth's changes during its preparation for the reception of organized beings, a history which has all the character of a great epic, having for its hero, MAN;" or, as he subsequently altered the last clause, "a great epic, the proemium of MAN." Alluding to the analogies between the animal and vegetable kingdoms, he remarks that "both kingdoms seem pervaded by a double representation of each other; two great spheres, as it were, repeated within themselves; a representation which will, in all probability, be found as true in the major as in the minor groups of organized beings." This analogy was one on which he loved to dwell. In

[1] On 7th February 1843.

[2] Part of the paper was read on 21st March, and the rest on 6th June, and the whole published in the nineteenth volume of the Transactions of the Society, p. 143.

the preparation of his lectures he kept [redacted] view, and it suggested those relations between plants and animals which formed the subject of the memoir on the Morphology of the Sertularian Zoophyte, read at the meeting of the British Association (1844), a paper which he regarded as one of his most important contributions to science.

There was a fresh, healthy tone about this introductory lecture which argued well for the lectures to follow. Though addressing himself chiefly to medical students, he discarded at once the doctrine that the natural sciences had served their turn when they had yielded to the student a certain number of names and facts, the recollection of which might be serviceable in after life. He seemed to have come fresh from Nature to demand for her study a high and honourable place among the recognised courses of mental training. He sought to impress upon his students that he aimed not so much to give them facts as the power of observing and discriminating them. "A student of any science," he observed, "well trained in the modes of investigation which that science teaches, is a much more valuable member of society than a youthful encyclopædia or a living book of facts." He wished to make them fellow-workers, and to infuse into their spirits somewhat of the zeal and enthusiasm which burnt so ardently in his own. "Much, very much," he assured them, "yet remains to be done; and there is no fresher field for original research and the development of a grand philosophy than that of natural history."

No wonder, then, that his class became popular. In

matriculated students it stood only second among botanical classes in London, but it was also frequented by many amateurs, drawn by his fascinating and novel treatment of the study of plants. Nor was the lecture-room the sole source of attraction. He renewed his favourite custom of taking the students to the country, and training them to habits of observation in the field. "Those who attended his class," wrote a friend and fellow-student of his own, "will ever remember the charm he threw around the study of vegetable structure, and the delightful hours they spent in his company during the periodical excursions, which he made a point of taking with his pupils, in the neighbourhood of London. Nor were these excursions attended by pupils alone. Many are the distinguished men of science in London who sought this opportunity of availing themselves of his great practical knowledge of every department of natural history."[1] Writing in the autumn of this year to his friend, Dr. Balfour, the future Professor of Botany at Edinburgh, he thus describes his summer lectures :—

"My class last summer went off very well. I had a most excellent set of men, who behaved admirably, and never flagged in attendance. I had three or four excursions of much interest, managed in our old fashion, alarming the neighbouring villages by an invasion of twenty or so *vasculiferi*. Shaw acted as my esquire and jester on all these occasions, and Lankester, with some other amateurs, also occasionally joined my ranks. My pupils were forty-eight in number, next to Lindley's, the best botanical class in London. If the forty-eight all

[1] *Athenæum* for November 25, 1854.

paid the fees into my pocket *more Scot*[redacted] very satisfactory; but the College absorbs [redacted] fourth of it, so that my receipts were much under the hundred; and as in one's first course there are many expenses, I get but little out of the total. As the College has a diagram painter, there was a saving on that score; for being obliged to be at the Geological all day long, I have no time to paint diagrams. The most provoking want is having no botanic garden, and I have no spare days to run after and make friends with gardeners, so that I have great difficulty in procuring fresh illustrations. Hooker offered me them from Kew, but on condition that I should go and select for myself personally, which is impossible as I am situated. We have a capital herbarium at the College, but when it is to be put into the state it should be I really cannot tell. It vexes me much thus to find myself unable to give sufficient time to any one thing.

"The medical professors at King's are a capital set of men, enthusiastic and talented. I have a fine room for a museum, and should desire nothing better than time and fortune to do as I like there. I am now only beginning to touch my eastern plants. When they are sorted they shall be distributed, but I cannot promise as to the time. My pupils in the 'Beacon' are collecting with great success, and sent me a few days ago a beautiful little parcel from Mount Ida, in Crete, including some things which may be new.

"I commend your intention of writing a text-book. What we want is a clear statement of the present state of vegetable physiology and anatomy, and a concise and

orders in a portable class volume. [illegible] felt the want of such."

In his account of the botanical session to Captain Graves, he says, "I got over my botanical lectures a fortnight ago. It was terribly hard work, as the Geological keeps me all day at it. I am rather fagged, and don't half like having so much to do; it has threatened to knock me up several times. Both offices are hard work, no play, and little pay. I had a good botanical class, forty-eight pupils, who were most attentive, and gave me three cheers at the end of the course—rather subversive of discipline. I gained great popularity by taking them out in three long walks into the country, and ending the days by dining together, with lots of punch (in moderation) and good songs. It was a new system in London, but I think will do. So much of the fees go to the College, that £64 was all my share, most of which went in necessary expenses."

When we consider the large amount of his time consumed by the Curatorship of the Geological Society, and also that the Report of his researches in the East formed part of his evening work, we cannot fail to be struck with the marked success of the first course of lectures. Their subject, as he felt when the Chair was first suggested to him, hardly lay within the sphere of his later studies, and he accepted the appointment with the full knowledge that he would have to work very hard to give an average course of lectures. And yet when the time came he had no leisure for lengthened and careful preparation, indeed hardly time for preparation of any kind, seeing that only two months before the summer session

of King's College began, he coni[illegible] been able "to touch his lectures." [illegible] tific work, in order "to make the ends meet," as he phrased it, he found it needful to throw off short literary contributions to the periodicals, especially the *Literary Gazette*. These necessarily occupied a considerable part of his leisure, and sadly encroached on the hours that should have been spent at the lectures, the Ægean Report, or other original researches.

This pressure of work told with marked effect on his spirits. His letters to Thompson, that were wont to be so vivacious, now contain frequent lamentations over his over-work, and the utter hopelessness of extricating himself from it. Thus, on July 20, when the lectures were nearly over, he writes:—

"DEAR THOMPSON,—On thinking over my letters lately to you, I fear I have been saying ill-natured things. You must pardon them, as my perpetual slavery here is fast spoiling a naturally bad temper, and making me like Tittlebat Titmouse in the novel. When your note came last night it found me in the dumps, and terribly gloomy. Not ten minutes before ——, one of the most reasonable of geologists, brought me back two most difficult papers, one very long, to abstract, which, two months ago, he had volunteered to do (they were his own), now saying that he thought I should do them much better than he could, and that they were not very difficult! thus giving me a full week's work additional. But I am the servant and they the masters, so it is no use grumbling, though it's terribly down-heartening.

"On Saturday my lectures conclude, when I shall

[redacted] can to get the Report over. I do hope but have my fears. If done, I go to Cork." Again, six days afterwards: "Dear Thompson,—I am writing hard at my Report. I have already made the rough reduction of all the dredging papers. On principle I must make it as near publishing mark as possible, before bringing it up, as I object, and so do most of the members, to any papers being read at the Association in a state in which they would not be admitted by a scientific society. Therefore I must not, if possible, read rough notes. I may retain the appendix of new diagnoses till afterwards. I have made up my mind to go to Cork. Lankester and I go together; Babington will meet us there. You must beat up among your countrymen for papers in our section, as I fear much the naturalists will not muster very numerously." A few days later he reports, "The vacation here is no vacation to me. I have as much to do as ever, and am puzzled how to get ready my Report in time. Besides, I am threatened at present with an inflammation of the eyes. If I am laid up, and can't bring my Report to Cork, I won't go, but don't anticipate such at present, fully intending to be there. It would not be worth my while to go there without my Report."

He had this year all his old anxiety to see a full assembly of philosophers at the British Association which was to meet at Cork. To naturalists, geologists, chemists, and physicists he writes or sends, urging an unhesitating visit to the Green Isle, even in spite of Dan O'Connell and Repeal. Many naturalists, however, had declined to go. "We must, therefore," he said, "make up for want of

numbers in the natural history Section [redacted] think the Cork people ought to give me a [redacted] ing as amateur whipper-in. I think I have persuaded Playfair to change his mind, and go for the sake of chemistry."

After the meeting of the Association, and a brief visit to Killarney, he returned to England, and spent a few days with his sister, Mrs. Atwood, in Staffordshire. While there he wrote to Thompson, "In a week I return to London, having a sad arrear of work on hand, in the way of Geological Proceedings, which must, if possible, be out before the meetings in November. I am hard at work at them here, having brought the papers with me. Since I saw you I have had a momentary return of my fever, known by its peculiar symptoms. It was, however, very slight, and I hope, as it gets slighter and slighter every attack, it will soon disappear, unless fagging in London aggravates the next return of it.

"The hurry and bustle at Cork prevented my doing many things I intended. On the whole our Section did very well, and it was in some sort a triumph to the provincial naturalists, as, except Owen, all the London chiefs were absent. It is to be regretted that Ogilby and Hyndman were not there to make up the list of Irish naturalists. The exacting spirit of the geologists at the beginning put me in bad humour for the meeting, and I have not yet recovered my natural spirits; if any of them take a grudge at my insubordination, they have it in their power to persecute unmercifully.

"I am glad to see that Ross and his expedition have returned safe and sound. I wish (it is not right, however,

had been two or three months later, as it [illegible]e the demand they will make on the Admiralty for publication grants will prevent Government lending its ear to the recommendation for the publication of the Ægean work."

While still at his sister's, a friend had written to urge his acceptance of the Curatorship of the Zoological Society, and on arriving in London (28th September), he thus stated his views to Thompson: "About the Zoological Curatorship, six days ago I wrote to Ogilby giving my reasons for not entering upon it. I have thought well over it, and it seems to me to be leaping from the frying-pan into the fire; for as sure as I did so, not only would I have a nest of geologists, but also one of zoologists about my ears. Were the situation such a one as would be a final object, it would be all well; but if I thought that I was destined to be either zoological or geological curator all my life, I should vanish immediately and stand the consequences. There is more mercy among immortals than mortals.

"Another and most cogent reason is this, that it is impossible to do the duties of the King's College Chair in connexion with any office requiring attendance every day, and all day, except the Geological, which is so near that I can run across and do things by snatches. Now, it is through the professorship I look to better things (if there be such), and it won't do to give it up till the last moment. In the meantime, I am infinitely obliged to Ogilby, and shall not forget his kindness. *Au reste,* I must just slave on."

Again, on 12th October, he writes to the same corre-

spondent, "That about the zoological I [redacted] when I wrote; the more I think of it, [redacted] that the necessity of my being near the College, if I am to hold any stewed-up office at all, forces me to remain where I am. The College is better this year than ever, and is the only medical school in London which has increased; but grow as it will I am no better, for the botanical chair will never enable its holder to quit offices elsewhere.

"As to the Athenæum, I certainly should like to be a member, but doubt if my income warrants such extravagance. Poor working men have no business in clubs, and such are not likely to be elect of the committee, and I would not ask the favour of any big-wig to propose me."

It is pleasing to mark how deep an interest, even in the midst of the engrossments of his London life, he continued to take in the wellbeing of his family, and how fully alive he showed himself to the weight of responsibility which rested on his shoulders. Thus, on the 25th October, he writes to George Wilson :—

"DEAR WILSON,—The pressure of the times, as the phrase goes, has prevented my putting my intentions of writing to you in practice for a long time. You must pardon my neglect, as you wrote last.

"Yesterday I had a note from Goodsir, in which he delivers a message from you regarding a little brother[1] of mine whom I formerly spoke of making into a chemist.

[1] Mr. David Forbes, already referred to in this Memoir, and widely known for his researches in chemical geology, the result of observations in many different parts of the world.

[redacted]ur advice on the subject, as it is time I [redacted]thinking of it. The lad is fourteen, very talented, but very versatile, of an enthusiastic disposition as regards science, but given, like myself, to meddle with too many subjects. Chemistry is, however, his hobby, and the knowledge he has picked up is surprising, considering that he managed to make himself acquainted with it in the Isle of Man. Of course, much of this being irregular, would have to be unlearned. At present he is at a school in Essex for the winter, working up, I hope, his mathematics, as I lectured him strongly on the importance of that branch of science to chemistry; 'forbye,' I know mighty little about it myself. Now, it seems to me that for a lad of this kind there might be a good opening as an analytical and advising chemist, especially in some of the English mining and pottery counties, or if a manufacturing firm would receive him to put him in fair train there. Circumstances require that whatever be done with him, it be done as economically as possible, my revenues, professorial and curatorial, being as yet small, and his further education, in all probability, being likely to fall on my shoulders. To give him a good *scientific* grounding first, is the great thing, and Edinburgh is doubtless the best place. I have seen something lately of the men who make money as analytical chemists in the English provinces; they are all empirics. Now, a clever young fellow well grounded and trained in scientific chemistry would, I think, if steady, make a good thing of it in the end.

"Please give your opinion on these plans, as it will

greatly guide me in my arrangements for benefit.

"Now, to other matters. I heard some time ago that your health was not so promising; I now hear you are looking up again, and promise to get over your ailments. Be careful, and doubtless you will master them. . . . Do tell me all about Brown, as I am most anxious to know, and John Goodsir's letters only whet one's appetite.

"If you drop into the reading-room, there is a little squib of mine in this day's *Literary Gazette*, entitled 'Blarney Revisited,' which may amuse you. Adieu! dear Wilson.—Your true friend and *frater*,

"EDWARD FORBES."

Further on in the winter, he was thrown into despair by the illness of another member of the family. "I have been in such a state of anxiety," he writes to Mr. Thompson, "in consequence of the dangerous illness of my only surviving sister, who was, during a week, hourly expected to die, but who, I am happy to say, has had a sudden and miraculous convalescence, at least for a time, that I have been unable to touch either your work or mine, and, until Thursday, did all my duties mechanically. Now, however, I hope in a day or two to have gone over the shells you left with me, and tell the results."

During the month of December 1843, and the early part of the following month, Forbes had to wage a constant and often unequal battle with debility and illness, arising, as he believed, from his "extremely sedentary and too worrying life." He suffered from frequent returns of fever, which not only reduced his physical strength, but

work into arrear, harassed and annoyed [illegible], on January 8, 1844, he wrote :—

"DEAR WILSON,—I am still an invalid, and this is my third day out of bed. I fancy, during my visit to Ireland, I caught the potato-disease, for I am sorely afflicted in *the kidneys*. It knocks me up for good work, and as I am in bad humour with the imperfection and delay of all I do, or rather attempt, I am not in the best condition for getting well speedily. Anent John Goodsir, I am very anxious, both for him and for the University, to which, having been an undutiful son, I bear great affection. Here, in London, any other appointment to the anatomy chair than that of Goodsir will be looked on with wonder, for of the men officially connected with the University, James D. Forbes and he are regarded as the brightest stars, and the farthest in advance of their time. The brilliancy and beauty and philosophical spirit of Goodsir's essays are unequalled in these times, and all men able to judge here and abroad look upon him as a redeeming light in Edinburgh.

"To poetry again. Let me recommend to your perusal Duffy's *Irish Ballads*. It is full of beautiful poems, especially those of poor Davis, and of my friend Ferguson."

In the Christmas week he succeeded in paying a visit of two days to Cambridge, and inspected the Colleges with Mr. Ansted and Mr. Babington. "I was greatly pleased with my visit," he says, "except in one thing,—to find that natural history is discouraged as much as possible, and regarded as idle trifling by the thousand and one mathematicians of that venerated University."

At this time, and during the ten years [illegible] his friends were constantly on the watch to [illegible] of any natural history chair vacant, or likely to become so, which might take him out of his uncongenial turmoil and excitement. It is amusing to see from his letters how various were the subjects, as well as the emoluments, of these chairs, and often how small the likelihood that, even if gained, they would make his life a quieter or more useful one. But any appointment that would remove him from London seemed to his many true-hearted correspondents in the country, the very thing that Forbes needed. And so, whenever the rumour rose that such or such a chair would soon require to be filled anew, the tidings sped at once by half a dozen channels to Forbes's sanctum in Somerset House.

A friend had written to urge his application for one of the Irish chairs. Of this project he remarked to Mr. Thompson (5th January), "I fear to venture on any steps, and certainly would not under any circumstances, so long as —— is even nominally in the field. At any rate, I could not conscientiously face a botanical chair, doing so little—indeed, nothing as I am—in botany. Moreover, any such contest would, in all probability, do away with any chance of getting Jameson's chair, which, small chance as I fear there is of getting, is now my forlorn hope, and only chance of escape from the worrying complication of offices in which I now am. I doubt also whether it would be worth while for me to go to Dublin without a prospect of a better salary (for fees are very precarious and changeable), and also of having more time at disposal than the curatorship would admit.

[redacted] circumstances, I had probably best hold [redacted] I am. I am like a sailor whose ship has gone down, and who is floating about the sea with a frail hold on a rough plank, but dares not give it up, lest he go to the bottom.

"A year next month and I shall be thirty; my apprenticeship, in the German sense, will then be up. If things do not look better, I have serious thoughts of abandoning science then for other views; but time enough to talk of that when the time comes."

The reference to Edinburgh in this note is repeated again a few days afterwards. "I spoke of Edinburgh merely because it is the only resource; but suppose it became vacant, I know not how I could get hold of it. It is in the gift of the Crown. Goodsir and others are anxious I should look out for it, and will give me earliest information on the subject; but I altogether despair of it. There will probably be many candidates; very likely Jardine, whose political interest will weigh; also Fleming, for whom there will be a strong push made by the Free Church party. Perhaps the chair will be split up, and, in that case, neither of the sections will be worth taking. My time here is less than ever, as work at the Geological is continually accumulating. The 'Rambles' are at a stand (though I don't like to tell Van Voorst so), for I am fitter for sleeping than writing when I get up to Southwick Street. My plants are rotting, and half my collections going to ruin. I wish I had stuck to the brush, and never meddled with natural history, which is only fit for independent amateurs."

In reference to another chair, he wrote again :—

"I could not conscientiously take the D[redacted] ship, even if it were offered me; I am not su[redacted] 'physician' (in the French sense) to be a geological professor. If it was a chair of Palæontology or Zoo-Geology or Natural History in general, it would suit. Besides, in these matters, I am a good deal tied up by college etiquette. It was hinted to me by a very good authority, that if I applied for a certain three years' zoological lectureship, I would in all probability get it. But my hands are tied. I must not take up any branch identical with that of a college chair. I don't complain of it, for the rule is a good one, and *must* be adhered to for the peace of Universities.

"However, at this moment, there is a glimmer of hope of another kind, the nature of which I am not at liberty yet to divulge, as it depends on a contingency, which a few weeks will decide. It may take me out of the very unpleasant position I am in here, and put me in one which will at least lead to good things. Don't mention or hint it yet, but answer the following query:—

"If the geological curatorship were suddenly to become vacant, would —— think of it in preference to his present office?"

He refers (under date February 24) in equally mysterious language to this projected scheme for removing him from Somerset House. "Work here increases every day. If I had not the prospect of getting out of it ere long (as I hinted in my last) I should give way under it. It is true that much of the work, such as reporting on fossils, is original, and adds to one's

[redacted] is impossible to do this *to order*, and [redacted] work too.

"However, I hope it will soon be over, and am, consequently, in better spirits and health; the one a necessary consequence of the other. I am not yet at liberty to divulge the nature of my plans, but my friends are determined to get it done, and the very few Geol. Soc. men who know what is in progress, viz., Fitton and Stokes (there may be others, but they have not hinted), are anxious for it, as they now see and say that this is not the place for me. The mover also is an F.G.S.; his name and the whole history you shall know by and by; I hope very soon."

The project which he so desired should be kept secret (and which he himself did keep so secret, that he boasts to Captain Graves that "even old[1] Thompson knows nothing about it,") was none other than his transference from the Geological Society to the Geological Survey. It appeared to Sir Henry de la Beche, the director of the Survey, that the labours of his officers would be materially aided by the appointment of a palæontologist as a member of his staff. At the suggestion of Mr. A. C. Ramsay, one of his surveyors, he had determined that the post should be offered to Forbes, and was in treaty with the Government for this purpose. The duties of the Palæontologist were to name and arrange the fossils of the museum, to determine the fossil-characters of formations by personal inspection in the field, and to publish from time to time

[1] "Old" was a favourite epithet of Captain Graves, applied by him to his most intimate friends.

the palæontological results obtained by the survey. For such engagements no man had higher qualifications than the curator of the Geological Society. The few friends in that Society who were admitted into the secret, though reluctant to lose his services in a post to fill which they looked in vain for a competent successor, yet stood staunchly by him, and everything bade fair for a speedy settlement.

With the prospect of soon entering a less exacting sphere of labour, the work at the Geological Society, though not less abundant, became less irksome. On the 2d of February he writes:—"DEAR THOMPSON,—For the last ten days I have been at work all day, and, frequently, through three-fourths of the night, getting on with the report, which our president commanded, on the British Lower Greensand,[1] and on the Indian Cretaceous Fossils,[2] which reports have taken up as much time as could be given to them since the summer; but which, nevertheless, were not ready when called for. The description in full, measuring and comparison, of about 180 new species (of fossils too), and the rectification of the synonyms of as many old ones, was no easy matter, and a more laborious task than the geologists fancy. However, by over-work, I contrived to have the results ready for Wednesday night, when I laid the reports on the table, and read a short statement of the conclusions I had come to, too brief and too deep to be understood by most who were there; but, as it will be printed, I

[1] "On the Lower Greensand Fossils in the possession of the Geological Society." *Jour. Geol. Soc.* I. 78, 237, 345.

[2] "Report on the Collection of Fossils from Southern India, presented by C. J. Kaye, Esq. and the Rev. W. H. Egerton."—*Jour. Geol. Soc.* I. 79.

those who can understand it will then

etc.

"In the meantime, shoals of letters, requests, queries, etc., lie unanswered; some of them requesting immediate replies. I am quite as bad as Goodsir, so feel your abuse of him as affecting myself. I answer your letters, because short answers will do; but I have many lying by me from other friends nearly a year old, which I can't find energy enough to sit down to. You 'gentlemen who sit at home at ease,' must not be too hard on us poor professionals, to whom a spare moment is like the intermission of an ague, too valuable to be spent in doing anything.

"I am now overhauling a pile of letters. Among which I expect to re-discover some of yours."

Notwithstanding these declarations, his correspondence at this time would have been regarded by most men as sufficiently voluminous. Every alternate day (sometimes every day) brought a note from Thompson, usually on natural history subjects, which demanded some examination of books and specimens, or no small measure of thoughtful consideration. Yet Forbes found time to keep up the correspondence without much irregularity, his replies being not merely notes, but often long letters. The interest, too, which he took in the transmutation war of Dr. Samuel Brown, led him into frequent correspondence with George Wilson. He fought his friend's battle in London, and at this time wrote almost every week to Edinburgh, to learn the state of the controversy and the positions of the chemists. Nor was this all; he had another circle of correspondents on the Mediterranean.

To Captain Graves he sent nearly every palimpsest of home news, with good wishes [illegible] all of his old comrades in the east. Lieutenant Spratt, Mr. Hoskyn, and others, also received occasional letters from him. When to these are added the countless little notes and memoranda of a business kind which, in spite of his repugnance, he found himself forced to write, we shall find cause not to blame his tardiness as a correspondent, but to wonder how he could possibly contrive to succeed as he did.

In March, he paid a short visit to the Isle of Wight, along with Captain Ibbetson, to examine the development of the Lower Greensand strata, and obtain information to guide him in the preparation of his Reports on the Fossils. The results of this visit were embodied in a short paper read before the Geological Society (May 1st),[1] and they also afforded material for a paper (with a large model) read before the British Association in the autumn of this year.

Besides the reports and catalogues of the fossils of the Geological Society, he this spring prepared a lecture on "The light thrown on Geology by submarine researches," for one of the evening meetings of the Royal Institution. To the preparation of this lecture he gave much time and thought, seeing that it was the most important opportunity that had occurred for the promulgation of the general views to which the Ægean researches had led him, and for the elucidation of those philosophical doctrines of the interconnexion of geology with the biological sciences which, ever with him a favourite theme,

[1] *Jour. Geol. Soc.* I. 190.

year or two been gradually occupying more of his time, and taking in consequence a more definite and appreciable form.

It was delivered on the evening of the 23d of February, and began by a reference to the early labours of Donati and Soldani (who dredged the Adriatic about the middle of last century), and then to his own dredging explorations in the Irish Sea and the Ægean. It consisted of a number of propositions; as, 1*st*, That marine animals and plants are grouped according to species at particular depths in the sea, and that thus, as we descend from the shore to the abysmal deeps, we meet with different zones characterized by different forms of life, exactly as in ascending a snow-capped mountain we find the flora and fauna gradually change as we recede from the plains. He next showed that the number of species diminishes according to depth, there being, according to his experience, no plants below 100 fathoms, and the probable zero of life about 300 fathoms.[1] Sedimentary deposits formed in greater depths would not contain organic remains save what might be drifted into deep water, and he, therefore, cautioned geologists against inferring that because a series of unaltered sedimentary rocks contained no fossils they must needs have been formed prior to the creation of life. 3*d*, That as British species of mollusca occur in all zones of depth in the Mediterranean, but are most numerous in the lower zones, there must be a representation of climates or parallels of latitude in depth, just as there is a corre-

[1] Subsequent researches by other naturalists necessitate a modification of these figures. Thus in the recent soundings for laying the Atlantic cable, living *Foraminifera* were found at 2000 fathoms, and living star-fishes at 1260 fathoms.

sponding representation in height in vegetable productions of a mountainous country. That all sea-bottoms are not equally favourable to life, sandy parts being usually the desert ones. Hence among rocks sandstones are usually sparingly fossiliferous. When a new variety of sea-bottom supervenes on the older one, a new tribe of organisms occupies its site, and thus were explained certain organic changes which often accompany lithological ones in the stratified portion of the earth's crust.

He next showed that such animals as are common to many zones of depth are those which have the widest horizontal range in space, being necessarily most independent of destroying influences, as elevations or depressions of the sea-bed. Such changes of level, even to a small extent, tend to the destruction of the species of a zone, and unless some provision were made the organisms would become extinct. This provision was effected, as Forbes now announced, by the remarkable circumstance that the mollusca migrate. Even the most sedentary of them, the limpets, in their egg-state are floated over the sea from shore to shore, but, of course, only arrive at perfection in the zone for which they are adapted. The lecture concluded by a reference to the harmony of the views now promulgated with those entertained by many modern geologists.

As a lecture it had a marked success. "The night," as he wrote next day to Thompson, "was villanously bad, yet, in spite of the weather, I had a very splendid audience. The geologists behaved well, and mustered strongly. It went off capitally, and I have reason to

much to raise my position here." He [illegible] his anticipation. It was now that he obtained that hold, which he never afterwards lost, upon the respect and sympathy of the higher influential class of London society.

To the success of this lecture he attributed the grant of £500 now given by Government to assist the publication of the Ægean researches. It also procured him an invitation from Sir Robert Peel to a soirée given by that minister in honour of the King of Saxony, of which Forbes has left an account in a letter to Mr. Thompson :—

"Sir Robert's party," he says (July 1), "was very pleasant. There was no crowd. It consisted of about half *savans* and half noblemen, with a due sprinkling of ladies, among whom were several very beautiful creatures. Lady Peel showed to great advantage as respects her amiability, paying every attention to her guests. The Premier was abstracted and silent, though wearing a sterotyped smile. He was not in the room when I arrived, so that I had no formal introduction to him, but hearing Lord Northampton address me by name during the evening, he came up in a very marked manner, shook hands warmly, and expressed his gratification at what I had been about, and at the results of my travels. This was done in such a way that Lord Northampton, not understanding how Sir Robert should know them, fancied there was a mistake, and explained to the minister that he might be confounding me with my Edinburgh name-sake. This Sir Robert showed he had not done by telling Lord Northampton what researches he alluded to, which seemed

to please the P. R. S. much. His Lord[illegible] duced me to the King, who, having put some [illegible] about the Adriatic, I was enabled to tell him what he had done there when I was at Trieste, and what new plants he had found. His Majesty looked uncommonly pleased to find the details of his doings so well known, and talked to me about Tommasini and his journey for some time. He speaks English pretty well. On the whole you see I got off very well.

"Sir Robert Peel was also marked in his attention to Yarrell, seeking out the little man among the crowd, shaking hands with him, and telling him what pleasure his books had given him. These doings were the more notable as the minister did not talk to everybody."

In a postscript to one of his notes to George Wilson, inquiring after Samuel Brown, he adds, "Thanks for your compliment about my lecture, which did me service here, and I believe, has made me more known in town than before. As to giving credit to whom credit is due, rest assured the best way to do good to one's-self is to do justice to others. There is plenty for everybody in science, and more than can be consumed in our time. One may get a fair name by suppressing references, but the Jewish maxim is true, 'He who seeks a name loses fame.'"

One result of the lecture was the offering to him privately of the Fullerian professorship; a triennial appointment, with a salary of £100 a year, for which twelve lectures per annum were given on some natural history subject. "Were I free," he wrote to Thompson, "I should like nothing better, and have been much urged to

[redacted]e not, for I find that I have not half [redacted]ugh to do what I am doing, and that my lectures at the College are not what I should wish them to be. How then could I prepare a distinct set of lectures with diagram, etc.? The only way to do it (and that I would gladly do if I dare, but dare not), would be to give up the G. S. This I dare not do, for at the end of the three years I should go adrift without any distinct means of existence, for the College will never yield an income. This year is nominally better than the last, but really worse, for I shall have to give back half the proceeds towards a building subscription for the new hospital, nominally voluntarily, really compulsorily. I am like one of the personages in the last scene of the 'Critic,' if I move I die, though to stand still is extremely uncomfortable when there is a dagger at each side.

"All this would not give me the blues, if I myself only were concerned. But the fortunes of my family have gone wrong. I see clearly now that my two little brothers at least will have to look to me for everything, and it is the desire to provide for them that makes me both anxious and low-spirited."

This return of despondency arose to a considerable extent from some vexatious delays as to the post in the Geological Survey, so that for a while it seemed very doubtful whether his appointment would take place at all. Nor was it until the beginning of the following November that the matter came to a final adjustment.

The lecture at the Royal Institution formed only one of many engagements which Forbes found leisure to accomplish during the spring of 1844. He con-

tributed several articles to the *Literary Athenæum*; such, for instance, as one on Samuel [redacted] "Chemical Theories" in the former periodical, and in the latter, reviews of Phillip's "Life of Smith," Richardson's "Geology," Ansted's "Geology," etc.; also several *jeux d'esprit* to the same journals. In the revision of his botanical lectures for King's College, he continued the investigation of the analogy between plant and animal on which he dwelt during the first season, and he now embodied the results in a paper for the ensuing meeting of the British Association to be held at York.

The end of July brought his second course of lectures at King's College to a close, a result which he chronicles as "a great relief." But the press of work at the Geological Society still continued. Sir Henry de la Beche had indeed given him an informal notice of appointment as palæontologist of the Survey, and, acting on this, he began, when the lectures were over, to arrange the work at the Society's Museum, preparatory to the resignation of his post there. But the Government situation remained as unsettled as ever, and, until he received an official notice of appointment to the new office, he had resolved not to resign the old.

In this state of uncertainty he was glad to find himself in the second week of August among the hills of Wales. He joined Sir Henry de la Beche, Mr. Ramsay, and Mr. Warrington Smyth at Builth in Breconshire, and remained there for some days, taking part in the excursions by which the geology of the district was explored, and learning the general habits of the Survey, of which he hoped ere long to become a member. From Wales

he went to Liverpool, to visit Mr. Macandrew, and study that gentleman's collection of mollusca. The two naturalists spent some time yachting along the shores of Anglesea, and dredging whenever an opportunity presented itself.

These changes of scene and occupation put new life and energy into a body that had become somewhat jaded in the struggle with bad health and overwork. He returned to London to prepare for the Association meeting, and at once began, as usual, to act the part of what he called "an amateur whipper-in." To Thompson he writes (September 13) immediately on his return from the Irish Sea:—"Of course you will go to York. The meeting will, I believe, be one of the finest ever held, and there is a general feeling to support it. Liebig is in town to go, and many are expected. In the Nat. Hist. Section we shall have a good muster. Owen, Schomburgh, H. Goodsir, and Balfour, have told me they are going, and I hear of others. I hope Ball will appear, and will rejoice to meet Allman again. Of course Patterson will come with you, and the more from Belfast the better. The chemists will be very strong this year, with Faraday at their head; and the geologists intend also to fight hard. I shall give you further news in a day or two, when I have had time to see and hear."

Again, on the 17th of the same month:—"The meeting will be a very splendid one. I have just seen Wheatstone, who tells me that everybody will be there. . . . My papers are as follows:—

"*In Section C.*—A joint paper with Ibbetson (with splendid models) on the Isle of Wight Cretaceous Sys-

tem, including some startling new views of my own. I expect a shower of thunderbolts on my head for this.

"*In Section D.*—1. My theory of the Polype vesicle, which, with all becoming modesty, I hold to be one of the greatest (ideal) discoveries in natural history for many a day. 2. An Account of Macandrew's Discoveries, including the new Virgularia, and a new genus of zoophytes, a creeping Alcyonium from Loch Fyne. 3. (If I have time), on a new Beröe proper, and some anatomical notes on Cydippe. Besides contributions to the Dredging Report, which will be good."

In the paper on the Sertularian Zoophyte,[1] after alluding to the recognised doctrine of the ideal metamorphosis of the leaf or vegetable individual, in order to play a part in the reproduction of the species, he proceeds to inquire whether some of the humbler composite animals may not show an analogy of parts and functions. The example cited as illustrating such an analogy was the Sertularian polype, a branched, horny, plant-like animal, the branches of which are studded with little cups or cells. Each of these cells is the abode of a distinct and independent individual, and yet each individual shares in the common existence of the colony. Now, at certain periods in the life of the zoophyte, there appear projecting from the central stalk or axis, or springing from its branches, variously-formed bodies called "vesicles," in which the ova are eventually formed. It was the object of this paper to show that these vesicles really arise from a process analogous to

1 "On the Morphology of the Reproductive System of the Sertularian Zoophyte, and its analogy with the Reproductive System of the Flowering Plant." *Ann. and Mag. Nat. Hist.* December 1844.

that which produces the flower in a plant, viz., through an arrest of individual development, and the transformation of the individuals into an ovigerous mass, the little cells uniting to form protecting sheaths, within which the development of the new individuals is carried on.

On getting back to London after the York meeting, he wrote (19th October 1844) :—

"DEAR THOMPSON,—By this time you will have recovered the excitement of the York meeting. I went from York to Percy's at Birmingham, and found Faraday and his lady staying at P.'s. This was very delightful, as I had an opportunity of studying Faraday's character, which I found of the most open, simple, playful, and philosophical kind. We spent two days together, the mornings seeing sights and talking over science, the evenings conjuring and playing tricks, at which the great chemist is a first-rate hand. He was delighted with the York meeting."

The appointment to the Geological Survey still remained as undecided as it had been eight months before. Sometimes it seemed quite settled, and he was urged to clear off arrears at the Society, so as to be ready to enter immediately on the new duties. Then came a shade of doubt, deepening ere long into dark and hopeless uncertainty. In this state of alternate hope and fear, he remained from the beginning of February till the end of October.

He had undertaken the duties of the curatorship with the determination to discharge them to the full. But his conception of their nature and extent was so high, that to fulfil them as he felt they should be fulfilled,

demanded more thought and time than were compatible with the simultaneous prosecution of independent original research. Add to this the large admixture of mechanical and uncongenial drudgery which every such office necessarily entails, the constant distraction of visitors, the endless questionings of learned and unlearned, and the weight of responsibility under which all these tasks must be borne, and we shall admit that the curatorship of the Geological Society, though well suited for other men, was no place for Edward Forbes.

Had he been possessed of a robust constitution, great physical endurance, and a mind little sensitive to the petty annoyances of life, he might have borne up against it all, and, indeed, the cheerfulness of his temper did help to make the irksomeness less pressing. But the confinement eventually told upon his health, the inability to find time for study, especially for the preparation of the Ægean Sea researches, preyed upon his spirits, the daily returning toil, and the constant turmoil of excitement, almost drove him to despair. At the same time, it must be freely admitted that as he had never yet been accustomed to regular and continuous labour, he would have felt any situation irksome that demanded it. Thus, duties which another could have accomplished with ease, and which in the end he might easily have himself discharged, were naturally enough regarded by him as an intolerable burden. But, more than all, he felt that precious years were rolling away, while his own legitimate work as a naturalist remained unaccomplished. He had tried in vain to find the needful leisure; his spare hours, when they could be given to work at all,

re claimed by other and more urgent duties. But tener he returned to his home in the evening too jaded for work, and too glad of a vacant hour, to use it in any other way than in enjoying the luxury of doing nothing.

The misfortunes that had visited his family contributed not a little to his anxiety. His father's pecuniary resources, which were once ample, had all been lost; one brother who had been unsuccessful in Australia, returned to find the home-circle broken up; his only sister had been prostrated on a bed of sickness, from which it was for a while doubtful if she would ever rise; the youngest brother seemed to have caught the seeds of a lingering and fatal disease; and the next (also a mere boy) looked for education and help from Edward, who, toiling as he did, could barely earn what sufficed for his own maintenance.

How earnestly he longed for a quieter and more remunerative post, his own letters show. For several months the prospect of the Survey appointment kept dancing fitfully before him, now on the eve of settlement, now as remote as ever. To his other vexations was added all the torment of suspense. The hope deferred that maketh the heart sick, threw a gloom over his spirit which all the innate buoyancy and cheerfulness of his nature could not dispel, and often in the bitterness of his soul he wished he had never forsaken the brush, or had chosen some profession that would have kept him out of pecuniary straits, and enabled him to help his family as he yearned to do.

Finally, however, towards the end of October, the Sur-

vey appointment was settled, and Forbes prepared to enter on his new duties. Like the office of Curator, that of Palæontologist must still keep him away from his purely zoological work. He knew this well at the outset. We cannot fail to perceive, however, that his interest in geological research, always strong, had, during his connexion with the Geological Society, been greatly increased by additions to his knowledge, and still more by the abundant opportunities of bringing his natural history acquirements to bear upon geological questions. The new world of zoo-geological investigation, of which he had caught the first glimpse many years before, in the Isle of Man, had been slowly growing in extent and interest as he approached it. Few explorers had yet visited it, at least in those wide regions that were opening out to his view. While toiling away at Somerset House, he had seen more and more of this new country. And though the unarranged results of his Ægean work still kept him fretfully longing to get back to the older domain of zoology, first, the delay in obtaining the Government grant, and then the hindrances of his official duties, kept him where he was.

Thus, partly by his own choice, and partly by necessity, he was compelled, as we have seen in the case of the curatorship, and now again as we shall find in that of Palæontologist, to forego his more purely zoological work, and effect a compromise by dovetailing it with geology. This compromise was made reluctantly enough at first, but the growing interest of the new work soon reconciled him to the change. The working out of the Ægean researches was indefinitely postponed until a

season of greater rest and leisure should arrive. And after the first repugnance passed away, he entered heart and soul into that line of palæontological or zoo-geological research which occupied the remainder of his life, and on which his fame chiefly rests.

CHAPTER XII.

THE GEOLOGICAL SURVEY.

To Sir Henry de la Beche, of happy memory, the last of a long line of barons that came to England with the Conqueror, Great Britain owes her Geological Survey, and, through it, those of her colonies. A little unobtrusive stone marks where he lies in Kensal-Green; a bust of him stands in the lower hall of the Jermyn Street Museum, and you may chance now and then to light upon his engraved likeness in the library of one who cherishes his memory. But no public epitaph records the labours of a man who for many a long year, with unwearied energy, spent time and toil and money in the service of his country, and in the cause of science. The volumes which he wrote, with the Survey and Museum which he founded and fostered, form, after all, his most fitting epitaph, as well as his proudest memorial. To have begun a great public work at his own charges, to have fought under every disadvantage with successive Governments, little friendly to science, and gradually to have extorted from them the nucleus of a national survey, to have guarded its progress, and watched each opportunity to increase its efficiency, and to have lived to be still its head, when it had grown up into a con-

spicuous branch of the Civil Service, and one of the most important scientific institutions of the country,—these are feats which speak their own glory, and which will place the name of Henry de la Beche in no mean rank among the benefactors of his country.

It was under this leader that our naturalist was now to serve. The staff consisted at that time of nine geologists[1] and a palæontologist, with some assistants, in the Museum at Craig's Court, which was the head-quarters of the Survey. The duties of the geologists were to investigate the structure of the country, and to insert on the maps of the Ordnance Survey the various lines of the different rocks, colouring the sheets eventually as independent geological maps. But in order to do this correctly, it was of course necessary to have frequent recourse to an accurate discrimination of fossils, and for this purpose a palæontologist was appointed, to determine the nature and names of the organic remains obtained by the surveyors or by the fossil-collectors. The palæontologist had thus occasion not only to work in the Museum, but also to visit the districts where the geologists were mapping, so as to see the rocks with the fossils in them, and to fix many points which no palæontologist can adequately determine, save by a personal inspection in the field. At present, the surveyors work singly, each taking his own district, but at the period in

[1] These were—

Mr. A. C. Ramsay, Local Director.
Captain James, R.E.
Mr. Warrington W. Smyth.
Professor John Phillips.
Mr. David Williams.
Mr. Trevor E. James.
Mr. W. Talbot Aveline.
Mr. Henry W. Bristow.
Mr. William H. Baily.

The Palæontologist was Professor Edward Forbes, and the Fossil Collector, Mr. Richard Gibbs.

the Survey's history to which reference is now made, the geologists surveyed in parties of two or three, or even more. Sir Henry used to be much with them, generally leaving London about the 1st April. Hence, at little out-of-the-way villages, there would sometimes be collected half-a-dozen stalwart hammerers, who took up all the beds and devoured all the provisions the resources of the place could supply.

Of this active and enthusiastic band, Edward Forbes became a member on the 1st November 1844, with a salary of £300 a year. With his cautious foresight, he drew up a memorandum of his duties, stipulating that his jurisdiction should extend over the whole of the fossils collected by the Survey in the three kingdoms, and should not be controlled except by the Director-General. This memorandum was accepted by the Board of Ordnance,[1] and contained the following clauses :—

"1*st*, The examination and description of the organic remains collected during the operations of the Survey.

"2*d*, The classification and arrangement of the said organic remains, in such order and manner as may most benefit the public, and tend at the same time to advance the interests of geology and the natural history sciences.

"3*d*, The superintendence of the publication of an account of such organic remains, and of drawings and engravings of them.

[1] At this time negotiations were in progress for the transference of the Geological Survey from the Board of Ordnance to the Department of Woods and Forests. In the beginning of the following year (1845), the arrangements were finally completed, and a Treasury Minute was issued, authorizing the junction of the Survey and the Craig's Court Museum, under the control of the Office of Woods, etc.

4th, The communication of information respecting organic remains, etc., whenever the Government may require such information.

5th, The attendance on the field operations of the Survey during a portion of the year, in order to observe the distribution of organic remains, and their relation to the strata, so as to verify and correct inductions drawn in the Museum, and to aid the surveyors in their determinations."

For some weeks after the date of his appointment he continued at the Geological Society, finishing what could be completed in time, and putting everything in train for his successor. The change, he said, was "a great relief both to body and mind," and he now began to think of joining the Societies[1] which his straitened means had hitherto prevented. To Mr. Thompson he wrote, "I shall now be proposed as early as possible at the Royal and the Geological, and shall also sound Stokes on the subject of the Athenæum. If I succeed in all these intentions I shall be in a good position here, and doubt whether I would leave it for poor ——'s chair."

The sensation of relief found vent in a characteristic way. Along with several of his more intimate friends he established a beef-steak dinner-party, which was to be convened on the third Thursday of every month thereafter, and to bear the cognomen of the Metropolitan Red Lions. This club has been alluded to in a previous chapter as a scion of the old stock that sprang up in the British Association. Its first members were original Red

[1] He was elected a Fellow of the Geological Society on 4th December 1844; of the Royal Society on 13th February 1845.

Lions, and carried with them into the younger brotherhood all the mingled mirth and earnestness that characterized its prototype. Forbes was its acknowledged head. He sang there some of his merriest songs, and told some of his raciest stories, amid the vociferous growls and applauding tails of his leonine brethren. His influence in these meetings was unbounded, but was an eminently beneficial one. He drew around him the younger scientific men of London, and while the brilliancy and playfulness of his conversation, and the open-hearted cordiality of his nature, bound them to himself, they became thereby insensibly united to each other, and linked together as one band. If he showed how a naturalist might be thoroughly social, he proved also by his daily life, that the same naturalist could be a patient, earnest searcher after truth. They knew how diligently he worked, and they could the better appreciate these periodical relaxations, when the exuberance of his spirit gushed forth in sparkling wit and merry song.

The "Metropolitan Lions," though at first, as Forbes called them, "philosophers," eventually numbered among their ranks not a few who, with no peculiar scientific tastes, yet possessed that love of good fellowship, which formed the cementing bond of the fraternity. Douglas Jerrold and Lover, for instance, both became Red Lions, and they with kindred spirits used ever to gather round Forbes, in whose company, artist, littérateur, and savant met as on common ground.

The foundation of a new society, however, by no means diminished his love for the old. The interest he still took in the "Brotherhood," seemed almost as lively

as it used to be in Edinburgh. With Mr. Goodsir and Dr. Wilson, especially the latter, he kept up a correspondence regarding the organization of the Order, and often in the midst of the turmoil in London he would sit down to write to the North for news of the brethren. His letters to his more intimate friends still bore conspicuously on their front the mystic triangle. The initials of his name were often worked into the same symbol, and when he wished to express the full measure of his sympathy and friendship, he coined an adverb out of the triangle, and subscribed himself, "Ever yours △ly, E. F."

But the lapse of years had somewhat stricken the "Universal Brotherhood of the Friends of Truth." Some of the brethren had done little to strengthen and propagate the principles of the Order; others had even violated them openly, and proved themselves wholly unworthy to wear the "roseate band." Hence those who had remained true to their vows, and were in consequence rising rapidly in their various spheres of employment, looked askance at the delinquents, and even in some cases, transferred their dislike to the Order itself. Matters had evidently come to a crisis when Forbes wrote thus to George Wilson :—

"16*th October*.—I regret to hear you say the name of 'frater' is not so dear to you as it was. You must not blame a body for the false actions or foolish ones of some, or even many of its members. Bear in mind there is always a band who, holding the true principles of the Brotherhood, will stand firm together and maintain them. You should stand with such, and not retire with the discontented. That the Order requires thorough renewal, we are all agreed; and accordingly, at York, a small conclave

met and discussed the matter very fully, seeking out the causes of evil and the remedies. The former we traced (as we believed) to the system of government (which will not work, and must be changed), and to the apathy and misconduct of some brethren who must be made to retire; but the principles, as set forth in the formula which poor dead Dobbie ornamented with his graver, one and all bound themselves to. One remedy proposed, and, I believe, a good one, is to demand (after the purification has taken place) annually an account of the doings of each 'frater.' Suggestions, however, will be demanded of every one; and do not, my dear friend, from disgust at the unfraternal conduct of any, desert a bond of union which may yet do good, and which may be put into action, the better, now that such among us as have a mission are gaining reputation, which gives power."

A month after this, he referred to the same subject in a letter to Dr. Percy. "I hope, now that I have got quit of the G. S. (Geological Society), I shall have time to make all △ arrangements. If possible, I shall run up to Edinburgh in Christmas week for that purpose." This intention he eventually accomplished, spending a few days in Edinburgh, where his younger brother David had entered Dr. Wilson's class for chemistry. The breathing time afforded him by the change of duties, from the Society to the Survey, was not of long duration, and ere the winter had well begun, Forbes found as much to occupy him in the second office as he had found in the first. The distraction, however, was greatly lessened, and if he could not obtain leisure to carry on

his own work, he at least was able to attend without much interruption to that of the Survey. "I have very snug quarters," he wrote to Thompson, "and have denied admission to all geologists." The fossil collections at Craig's Court had to be arranged and studied. The surveyors were at this time engaged in unravelling the geological structure of Wales, where constant reference had to be made to fossil evidence. Parcel after parcel of fossils was sent up to the head-office to be determined by the Palæontologist, and on his decision rested the determination of many of the geological lines. These duties, and the completion of his elaborate Reports for the Geological Society, left Forbes no available leisure, save now and then for some lighter production, as a short article in the *Literary Gazette*.

The *Vestiges of the Natural History of Creation* appeared towards the close of this year. Among the many denunciatory criticisms of that clever but crude volume, was one by Forbes in the columns of the *Lancet*. He speaks of his review as "short and pithy, taking effect on the unknown author as well as on the publisher."

He undertook to give a course of eight weekly lectures at the Royal Institution, but had no time, he said, to make them other than commonplace. The subject chosen was, "The Natural History and Geological Distribution of Fossil Marine Animals." In the first four lectures, he gave an outline of the fossil marine faunæ, from a natural history point of view; in the second half, he pointed out the order of succession, as displayed in the geological formations, and concluded by declaring

his disbelief in any transmutation of species in time, or creation in strict serial order, and his opinion that the laws which regulated the distribution of animals in time, were probably correspondent to those which regulate their present distribution in space.

The light in which he regarded the Royal Institution is well expressed in a letter to Dr. Percy, written shortly before the commencement of these lectures: "I would urge strongly on —— to look far beyond the applause of the Royal Institution (a capricious though capable audience), and to work mainly at his discoveries for the Association and for the Royal Society, to which, if he has any very elaborate papers, there would be no difficulty in submitting them. His lectures here will, I hope, however, gain him some influential friends. Let his facts and illustrations be as *striking* as possible, that is, as *remarkable to that part of the audience* (more than half) *which consists of those who know nothing at all about the science of the matter, as to those who know and understand.* This is the secret of success in the Royal Institution and in London. It was the secret of Davy and Faraday, and of all who have made a sudden and meteoric reputation in this ugly, unphilosophical, lion-hunting centre of the universe."

While his lectures were still in course of delivery, he entered the Athenæum Club (28th January 1845), under circumstances of a peculiarly gratifying kind. Without reference to the date of his proposal, he was, on the strong recommendation of Professor Owen, specially elected by the committee, and this highly honourable admission, or "short cut," as he called it, was due in

great measure to the publication of his York paper on the morphology of the Sertularian zoophyte.

The subject of this paper also furnished material for one of the Friday evening discourses at the Royal Institution (14th February), which he had undertaken to give, in addition to the course of lectures, to the members of the same Association. Of the latter series, the last lecture was written on the 11th of March. The letter to Mr. Thompson, in which he mentions it, gives a picture of his daily life at this time :—"Yesterday was taken up with my last lecture at the Royal Institution, which I began, concluded, and ended during the day; and from the exciting nature of the subject, was unfit for even reading a newspaper afterwards. To-day I have only one hour to spare, which hour must be taken up answering some eight letters accumulated during the last week, one of them your own. In half-an-hour's time I have to attend Sir Henry on Survey matters, which will last till three o'clock; three to six, Geological Council (matters of consequence that must not be missed); the rest of the evening with Geological Society, and dinner-time; snatching half-an-hour between eight and nine to see the drawings at the 'Graphic.'

"I cannot and dare not work in the evening, and am far too anxious and busy at present for my bodily welfare. All I can do I can't get right, nor will, until I have a long run in the country. Three days a week, and half of every day, I am not in a fit state for work of any kind, and can only hope. My chief objects at present are, to get the *Lycia* out, to watch the progress

of the Survey arrangements, and assist De la Beche, to get out my remaining papers formerly read at the Geological Society, and to get my botanical lectures over, and to keep awake till they are finished. The "Ægean Zoology" is at a stand-still. Without room to lay out the specimens in consultable order, or time to study them, or my own way about their publication, it is a cheerless task, and unless I can do it well, which I could if I had leisure, I have no wish to do it at all. I feel almost vexed now that the grant was applied for or given."

The contest with bodily pain and debility to which he alludes in this letter, sometimes nearly paralysed all mental exertion. His first lecture, for instance, he regarded as such a failure, that "illness only could excuse it." Moreover, to physical weakness was still added anxiety regarding his family. "Had I foreseen," he bitterly exclaims, "the torrent of misfortunes which has poured on my family, I should have taken some other course in life that might have enabled me to assist them, which science is not very likely to do, though all very well for one's-self." Yet from these depressing thoughts he could pass rapidly into a lighter mood; grave and gay alternated with him as often and as naturally as light and shadow athwart an April landscape, and in the brighter intervals his spirits often found their vent in song. It was during one of these moments that he wrote this spring a Palæontologist's Valentine.

VALENTINE.[1]

BY A PALÆONTOLOGIST.

Borne upon Pterodactyle's wing,
  This heart, which once you deemed of stone,
Model of maids, to thee I bring,
  And offer it to thee alone!
  Not Owen, pondering o'er bone
Of great Dinornis, fonder grew
  Of mighty wingless birds unknown,
Than I, sweet maid, of you.

The Glyptodon, which Darwin found
  Beside the South Atlantic main,
Was in no harder armour bound,
  Than that my spirit did enchain;
  Till, bade by thee, Love rent in twain
The fetters which my fancy tied
  To boulder, glacier, and moraine,
And bore me to thy side!

Like some fantastic Trilobite
  That perished in Silurian sea,
And long lay hid from mortal sight,
  So was the heart I yield to thee.
  Now from its stony matrix free,
Thy palæontologic skill
  Once more hath call'd it forth to be
The servant of thy will.

GEOLOGICAL SOCIETY, *Feb.* 14.

He refers to this song in a letter to Mr. Thompson. "Look at last *Literary Gazette*," he says, "for a song of mine. Buckland amusingly enough quoted it in full at the geological anniversary dinner yesterday, not knowing the author. De la Beche afterwards, in returning thanks for the Survey, wickedly proclaimed that it came from our staff, and urged it as a proof that any sort of article could be produced in the Museum of Economic Geology."

The "Universal Brotherhood," as we have seen, still

[1] From the *Literary Gazette*.

lived, and those brethren who were resident in London met on the 9th of March to celebrate the anniversary of the Order. The "Red Lions" too had some merry evenings this spring, continuing to add to their numbers, and not unfrequently welcoming to their board those "Association Lions" from the provinces who happened to be in London at the time. The evening of the 17th April is especially chronicled as one of the most thoroughly enjoyed in the long history of the club. They met at the "Cheshire Cheese" in Fleet Street, twenty in number, including Owen, Goodsir, Falconer, Forbes, A. C. Ramsay, Captain James, Morris, Francis, Jerdan, Cook Taylor, Richard Taylor, Tulk, Henry, Henfrey, Busk, Waterhouse, Playfair, and Chambers.

The spring months wore away, and May brought round again the lectures at King's College. These were not over when the British Association met at Cambridge in July, two months earlier than usual. Forbes attended the meeting, however, and lodged with a merry party at Jesus College. "I go up," so he wrote to Dr. Percy, "with a paper on the geographical distribution of local plants, a very curious subject which will take many people by surprise. I am prepared to show that the present flora of Great Britain originated in at least four distinct geological epochs." He also read at this meeting, "Notices of Natural History Observations bearing on Geology." The first paper formed the groundwork of his memoir on the same subject published the next spring in the first volume of the Memoirs of the Geological Survey. It formed, too, an epoch in geological speculation, and in its completed form, is unquestionably one of the

most masterly, as well as beautiful generalizations to be found in the whole range of British scientific literature.

The "Red Lions" met as usual every day during the meeting.

Forbes now left London to enjoy some weeks of cruising and dredging in the far North. We have seen in a previous chapter, that when during his residence in Edinburgh he visited the Shetlands, he found so much to interest him, that at the end of his notes he added "*N. B.* Must go back to Shetland." Since that time six years had rolled away; in the interval, the struggle to obtain a lectureship in Scotland, the cruisings in the Ægean, and the two weary years at the Geological Society, had come and gone, and the enthusiastic student had merged into the equally enthusiastic, but much harder-worked professor. He gladly availed himself now of the opportunity of revisiting the northern extremity of the kingdom. Starting about the middle of July, he arrived at Lerwick, and found there awaiting his arrival, Mr. Macandrew of Liverpool, who had come in his yacht by the West Coast, dipping his dredge here and there by the way with no little success. One object our naturalist had in view in this voyage was to familiarize himself with the seaweeds, especially with their distribution in definite zones of depth. But of course, the chief portion of the time was occupied in dredging. Among the results of the first fortnight he enumerates twenty new species of medusæ, all of which he carefully sketched and described at the time; two or three new molluscs, and two new echinoderms. One of the most interesting features of the excursion was the discovery of several living molluscs, which had up to

that time only been known in a fossil state, associated, in the pleistocene beds of the Clyde and elsewhere, with northern shells.

From the Shetlands the naturalists cruised south-west among the Hebrides, dredging in the deep kyles and lochs that indent these wild western shores. By the middle of August they had dropped into the Bay of Oban, whence they made for Loch Fyne, spending two successful days there with the dredge, and eliciting some curious and new facts regarding the physiology of the *beröe*. It was the beginning of September before Forbes returned to London. He had no sooner arrived there, however, than he received instructions to join Sir Henry de la Beche in Ireland, to assist in the determination of the rocks of Hook Point, Wexford.

Sir Henry's enthusiasm and activity were at this time fully equal to those of his staff. Often he was ready for work by dawn, and did not drop hammer till dusk. The excitement of detecting new fossils, and recognising old ones, of eliciting the grand physical structure of the country, and disentangling the intricacy of its details, kept the party busily at work. The freshness of out-door labour, by breathing new life and heartiness into their spirits, braced them for physical exertion. No company, indeed, was likely to lack life when De la Beche and Forbes were members of it. They threw a charm round their work, even in its dullest parts, that stimulated their colleagues, and again reacting on themselves, kept the party in perpetual activity and good humour. The evenings, too, after the walking and hammering of the day were done, passed merrily

away by the fireside of some cabin or village inn, Forbes chanting some of his humorous scientific songs, or inscribing them on sheets of foolscap, with gnomes, fairies, and other quaint devices along the margin.

Very pleasant, therefore, were these days in Wexford. They had but one annoyance, but it was so serious as almost to outweigh the pleasure. They allowed of no time for anything save the work of the Survey, so that, in the midst of his enjoyment, Forbes found his thoughts reverting to the Ægean stores, still untouched, and to the notes of travel in Lycia, which had been sent to him by Lieutenant Spratt, with a view to publication, but which he had been able to do little more than begin. The long hours of Sir Henry only permitted a page or two to be done every day, a rate of progress that promised to keep the book many months in preparation. "I fear," he writes to Mr. Thompson (17th September), "this survey, however pleasant, will never admit of other pursuits than its own."

After an absence of about a month, he returned to London to begin the work of the winter. To Mr. Thompson, he writes :—

"*Nov.* 15.—Sir Henry is out of town, and I am availing myself of his absence to get on with the 'Lycia,' *i.e.*, getting three hours every morning for the work. But as I can only write when I am in the humour, and am abominably sulky and gloomy at the hopelessness of working science in this clerk-like system of ten to four every day—no time for thought, reading, writing, or travelling—I am in the humour very seldom, and can do nothing. I feel like a bird in a cage, and sing out

from pure vexation. I begin to think science all humbug, and think, almost with fear, on the habit I am getting into of rejoicing when office-hours are over. As to the Ægean researches being worked out, it was a pleasant dream while it lasted. People without independence have no business to meddle with science. It should never be linked with lucre."

These fits of despondency either prognosticated or induced an illness, which began about the middle of December, and confined him to his room for six weeks. Nephritic ailments had been hereditary in his family, and it was found that with him also the same organs were unsound. The illness began by derangement of the kidneys, which increased to suppuration, produced by the presence of a crystalline deposit. The process of cure, by cupping and blistering, with the accompanying low diet, sadly reduced the strength of a frame that had never much to lose. Work, too, was strictly forbidden; and so, while the printers waited for the sheets of the Lycian travels, and the Geological Survey for his indispensable assistance in the determination of fossils, he had to lie in bed, or, when able, sit by the fireside, reading Clarendon and writing letters. It was but natural that the letters should be fretful. He draws gloomy pictures of the future, how his days of bookmaking are over, and how nothing in the literary way remains to him, save the hope of perhaps now and then throwing off a squib or song, all chance of ever working out his researches has gone, and no prospect stretches out before him, save one long and dreary pathway of uncongenial toil and drudgery, ending he knows not

when, and cares not how. But in all this he had more than the mere sick man's plea, and he attempts to justify his repinings in a letter to Mr. Thompson :—

"*Dec.* 29, 1845.—I write this scrawl from my bed, in which I have spent my Christmas. I have had a very unpleasant attack of illness, but hope I am now getting over it.

"In your last you chided my discontent, but mistook the cause. I am not despondent though discontented about income; that at present is as much or more than I had a right to look for, but because as long as I hold my present office—which I must, to exist—there is no chance of my doing any of the work which I had chalked out for myself. All my Ægean material must go for nothing, and as to my literary prospects, they must be consigned to the tomb of all the Capulets. I find every day that in these Government clerkships they would rather make one idle the time than do anything *not official.* One is no longer a free agent, but a (well-used) slave. If things went better with my unfortunate family I would brave all chances, but must not for the sake of others."

Again,—"12*th January* 1846.—The plain fact is that I have *no chance* of doing any of my own work as long as I am connected with the Survey. The Edinburgh Chair of Natural History is the only outlet of escape I can see, and I have warnings that I must keep my eye open to that quarter, probably very soon. I have, however, very little hope; for those who wish me to remain here, will, I feel sure, not aid my departure. However, I shall make an effort; the more so because

the complaint which now tortures me is one, the return and intensity of which will depend much on ease of mind and freedom from pressure of work."

After the lapse of six weeks he began to go out of doors for a short time every day, and by degrees recovered sufficiently to attend once more at Craig's Court, but it was long before he had resumed his wonted measure of health; all the rest of the spring and summer he complained of pain and weakness, and though these wore away, the effects of this illness are traceable through the remainder of his life, and it was a return of the same disease which ultimately carried him to the grave.

By the 27th of February, he had gained strength enough to resume his place as a lecturer at the Royal Institution. On March 9th, he writes to Mr. Thompson, —"The lecture was a brief abridgment of one of my Survey reports—'On the relation of the existing fauna and flora of Britain to the later geological changes, and especially to the epoch of the northern drift.' One half of this is now in the press, and I am hard at work at the rest. Though the father of it myself, I will say that this paper will change, nay, revolutionize the whole subject of the geography of botany and zoology, or rather, will be the herald of such a change.

"The first vol. of 'Lycia' is now printed, and the second is in the press."

March 28th.—"I am getting stronger, and I trust better, but this weather, and the overpress of work (now to last till middle of July) sadly impede a fair recovery. I don't half like my bodily condition. I take every care,

drink water, eat by rule, and rarely go out at night, but the real remedies, leisure and country air, are not to be had.

"My Report for the Survey still goes on, and will be a *coup d'œil* of the history of the British flora and fauna of a very novel kind. De la Beche fortunately has taken an interest in it, and lets me write it partly at my rooms. The printers are behind with 'Lycia,' not I.

"I have just terrified the geologists by maintaining at their meeting that identity of fossils in strata geographically far apart, must lead to the inference that the beds were of *different*, not, as hitherto maintained, of the same age."

Two days after this letter was written, viz., on the evening of Monday, March 30th, he gave the first of a series of six lectures to the members of the London Institution, "On the Geographical and Geological Distribution of Organized Beings." The general nature of these lectures may be gathered from the subjoined list of their titles:—

"I. On the Geographical Distribution of Existing Land Animals and Plants.

II. On the Geographical Distribution of Existing Aquatic Animals and Plants.

"III. On the Geological Distribution of Organized Beings during the more ancient Epochs.

"IV. On the Distribution of Organized Beings during the later geological periods.

"V. On the History and Origin of the existing Animals and Plants of the British Islands.

"VI. Conclusions resulting from a Comparative View of the Distribution of existing and extinct Animals and Plants."

The last lecture of the series was given on the 4th of

May, and then came the botanical course at King's College. This constant lecturing tasked his strength not a little, and it was with an inexpressible sense of relief, that about the middle of July he found himself free to leave London. Before doing so, however, he had the satisfaction of completing his great paper "On the connexion between the distribution of the existing Fauna and Flora of the British Isles, and the Geological changes which have affected their area, especially during the epoch of the Northern Drift."

In addition to this long and elaborate Memoir, the last chapter of "Lycia" was also completed. Forbes had thus written this spring, in addition to other duties, a memoir of one hundred closely printed pages of wholly original matter; and had prepared for the press two octavo volumes containing, among lighter subjects, much careful scientific writing. A few weeks of rest were thus needed, and he hastened to enjoy them.

Mr. Macandrew had invited him to a dredging cruise between Liverpool and Southampton, and as the Association was to meet this year at the latter locality, he resolved to accept the invitation. To Mr. Ramsay, his intimate friend and colleague in the Survey, he writes, 23d July 1846:—

"DEAR RAMSAY,—I am in a fix in so many ways, that I am doubtful about how to arrange. My lectures are just over, but I have not yet succeeded in getting the printer to push the Lycian Travels through the press. They are delaying over Greek inscriptions, and the delays have been so long and vexatious, that I will not move till it is through. A week, however, will tell how it

advances. There are only fifty pages of it more to print. The writing was done long ago.

"On the other hand, the Geological Society people are pressing me about the Pondicherry Report, which is now ordered to be printed.

"Thirdly, Macandrew has written to me offering to take me round from Liverpool to Southampton after the 10th in his yacht. A part of this sail I am resolved to go with him, as it will give me an opportunity of examining the sea-bottom between Wales and the Land's End, an opportunity not to be neglected for our own after-work. In a few days, however, I will have seen my way clearer through my work, and will write again. The clearing away of the 'Lycia' and the Geological Report will ease my mind a good deal, and leave me freer."

Again to the same friend:—

"I must delay joining you till after the Meeting, now that I see plainly I cannot get away from this before the week after next. Macandrew has then offered to take me in his yacht on a cruise round the Land's End to Southampton. The observations during such a cruise would complete much I have in hand, and add greatly to the stock of information required for working out our own fossils. But this is not the main reason for my going. My complaints still linger about me, and I feel sundry twitches daily that give me some alarm, besides which I am very evidently not as well as I ought to be. The first point with me, according to my medical friends, is to get pure air without much exercise. This I can get on board Mr. Macandrew's yacht, which move

they strongly recommend. Once a little pulled up, I must combine the exercise with the air, and keep out of London as much as possible through the autumn. Joining you, and getting clear work with you, will be best for this, and such I propose to do after the Meeting. But in order to do this, I must clear off all I have lingering on my hands here, and this detains me. 1*st*, I must draught out a series of work for Bone and Baily.[1] (This is now nearly done.) 2*d*, I must see the last sheets of the book on Lycia through the press. (This, I am happy to say, is also nearly done.) 3*d*, I must see the Pondicherry Report in hand at the Geological. 4*th*, I must give in Burmeister corrected to the Ray[2] Society: so you see that I have a precious press of work, not by any means easy in this broiling weather. Sir Henry approves of my moves."

The work was accomplished in time to give him a

[1] Two of the artists employed in the Geological Survey.

[2] Forbes had a characteristic pun on this word. He once ended a letter b subscribing himself—

"A MEMBER OF THE RAY CLUB."

week or two on the Atlantic previous to the meeting of the Association. Just before starting, he wrote, "I am beating up for papers, etc., for the Southampton meeting, in order to keep up the credit and spirit of the natural history section, which at present promises well. I have hopes, too, of having persuaded a brace of active physiologists and new hands to join the desolate Section E." The change from the atmosphere of London, charged with all the heat and stench of midsummer, to the free, fresh breezes of the Cornish coast, soon revived him. He had got rid of his pen, too, for a time, and had taken in its place the dredge, a not less familiar instrument. And so forgetting all the din and turmoil that were left behind, he launched with new zest into his old seafaring habits; dredged and sketched by turns, or, perchance, lay idly on the deck watching the gulls that wheeled in circles above him, and the ripples that kept lapping against the bulwarks below.

Putting into Dartmouth, he wrote to his ever-kind friend, Sir Roderick Murchison (who this year was to take the presidency of the Association) :—"I am now on my way to Southampton, dredging the sea between the Land's End and Southampton, and hope to bring up not a few novelties and interesting creatures, *alive*." He sent at the same time some valuable remarks upon the impetus which he conceived the Association had given to the progress of natural history researches. The Association having been made the subject of bitter sarcasm and ignorant abuse by certain writers in the *Times*, Sir Roderick was anxious to show, by actual facts, that it had done good service in many ways. In this desire

Forbes cordially concurred, furnishing copious notes, in which the labours of his contemporaries were most generously narrated. After the meeting, too, he continued his exertions, aiding in the preparation of an article in the *Morning Herald*, by one who had recently been among the most powerful contributors to the *Times*. Referring to the end of the whole controversy, he remarks to Sir Roderick, "It is some consolation to know that the buffoon who wrote the miserable attacks in the *Times* is conscious of his failure, and that his employers are enraged at their defeat. It was left for the weakest of all the Thunderer's myrmidons to conduct the attack; the best men would have nothing to do with it. Even *Punch* grew ashamed of the folly of a crusade against science, and the few weak squibs which appeared in its pages were without doubt from the same hand with the heavy *Times'* leaders. One of the most powerful of the wits was so disgusted at the proposition of an attack, that he immediately wrote an article in favour in the *Daily News*. The Association never gained more friends than through this campaign of the *Times*, conducted by a jesting puppet, whose strings were pulled by sneering and pseudo-scientific humbugs."

At the Southampton meeting Forbes read—

1. On the Pulmograde Medusæ of the British Seas.
2. On the localities and geological features of the Isle of Wight.
3. Notices of Natural History observations, made since last Meeting, bearing upon Geology.

On his return to London, he wrote to Mr. Ramsay, 29th September:—"We missed you at the meeting when

the Lions had great fun, as I shall tell you when we meet. My cruise did me much good, but I must be very careful about wet and cold this winter, for some awkward symptoms yet remain." He had arranged to go down to the Survey in Wales, and accordingly, on the 14th of October, he joined Professor Ramsay, Mr. Jukes, and Mr. Aveline, at Bala.

Sir Henry de la Beche, for the first few days, formed one of the party. When he left, the surveyors settled down to unravel the complicated geological structure of that beautiful locality, each taking his own area, while Forbes assisted them in turn as they required palæontological aid. They were all young, and all enthusiastic; their constant exercise in the open air gave them good appetites and excellent spirits; the interest and excitement of their work drove away all care and anxiety; their common labours and common sympathies bound them pleasantly together, and this bond was rendered all the closer by that marked endearing influence which, as we have seen, Forbes had from his boyhood exercised on his comrades. Thus united, they found the gloomy days of a dark October wear quickly away. Much of the weather, indeed, proved too gloomy for Forbes to venture far among the hills. During such intervals of confinement, he employed himself in-doors among the fossils from the Silurian rocks of the district, brought to him chiefly by the excellent and indefatigable Richard Gibbs, the fossil-collector to the Survey. When he climbed the mountains, it was after a fashion wholly his own. Wrapping himself in an old plaid of the Forbes tartan (green and black), he would stalk up the steepest slopes with

the greatest ease and unconcern. When it rained (and rain had been sufficiently abundant that autumn), he would crouch beneath a wall or a boulder, and, throwing his plaid entirely over his body, sit with nothing visible but the point of his nose protruding from between the muffled knees. The motionless figure looked somewhat like a gigantic dirty green toadstool, or, if he showed more of his face, and perhaps pushed out his long bony fingers, it had a weird, uncanny look, which a stranger even of strong nerves would have hardly cared to encounter alone on a wild mountain side, and which would certainly have terrified to death any luckless Welshman, and so have given the mountain a bad name for the next generation. The litheness of his body at this time was altogether surprising. Separating his feet, he could sit down between them, and then twisting his arms through his legs, bring his knees over his shoulders. In this position he walked upon his hands, with his face peeping comically from between his legs, like some of the elvish forms that he loved so much to design.

The close of the day brought the several parties home to their common rendezvous in the little town of Bala. After dinner, when the notes of the day had been adjusted and compared, the hour or two before bed-time (for they all went early to sleep), were passed in easy chat over the evening pipe. Forbes was never a great smoker, and now, unable to keep pace with his friends, he preferred to seize a brush and colour-box, and illustrate with fays, gnomes, and elves, entwined in wavy wreaths, some of his own humorous or anacreontic effusions, throwing out, in the meanwhile however, quip

and jest and fun, or telling over, with great glee, some of his adventures in the East.

These weeks of rest and gentle excitement sent Forbes back to the metropolis with body and mind alike refreshed. He returned on the 14th of November, in time to take part in an application to Government, relative to the grant of £500 for the publication of the Ægean researches. When this grant was given, Sir Robert Peel had unthinkingly handed it over to the charge of the Stationery Office, and poor Forbes found that in place of getting the sum which had been unconditionally given, to dispose of as he judged best, the entire printing and engraving had been taken out of his control, and engravers fixed on of whom he had never heard. To bring out, under these conditions, such a work as he designed, was of course hopelessly impracticable, and hence one cause of his low spirits during the preceding winter. While still at Bala, the controversy with the Stationery Office was renewed, by the urgent appeal of Sir Roderick Murchison and Colonel Sabine representing to Government how injuriously the restrictions of that department were operating. They requested a statement of his views from Forbes, who sent in reply what he thought a fair report, possibly rather strongly expressed, though he wrote at the time that he did not see how he could have said less, without seeming to be afraid of the revenge of the Stationery Office, even though that Office could effectually cripple the palæontologist of the Survey in his publications.

When he reached town, long meetings and audiences took the place of indignant letters. The end of the

question, however, was the decision of the Treasury in his favour. The sum was left to be disposed of according to his own plan, and all arrangements about printing and engraving remained entirely at his discretion.

The money thus granted, and all the material ready for arrangement and study, nothing further was needed save leisure to carry on the work. But, unfortunately for Edward Forbes, and still more unfortunately for science, this needed leisure never came. Through the remaining years of his connexion with the Geological Survey, other engagements pressed upon him, and when at last he gained the natural history chair of Edinburgh, and began to prepare for the elaboration of the vast mass of scientific material collected in the East and elsewhere, he was cut off in his prime, and his wide and varied knowledge, to a large extent, died with him.

It formed part of his plans for this winter to visit Edinburgh. One of his chief reasons was to take such steps upon the spot as might be necessary for promoting his election to the chair of natural history there. Professor Jameson had been ailing for some time, and had latterly become too weak to continue his lectures, which were temporarily read for him by one of his colleagues. Already several candidates had begun to stir, and the contest seemed likely to be a keen one. Forbes's good feeling, however, led him very soon to abandon the idea of visiting Edinburgh for such a purpose, so long as his old master lived. He contented himself with the active co-operation of his friends in the north, who constantly apprised him of every change of probabilities, and of all the movements of those who had either professed them-

selves his rivals, or seemed likely to do so. His great fear at this time was that the chair would be divided; and as there appeared to be no hope that Government would endow either of the severed portions, his prospects of a life of congenial work in the north, ran some risk of being now finally dashed to the ground. "If I leave London," he said, "it must be for good; and I cannot leave it for a mere student's income."

The division of the Edinburgh Chair, which Forbes contemplated with so much disfavour, was one which would have greatly marred the usefulness of the chair, and impeded the progress of natural history. It was proposed to separate the Museum from the professorship, and place it under a distinct superintendent. In this way, a powerful element of discord could hardly have failed to be introduced into the teaching of natural history, and the freedom, as well as the dignity of the professor would have been impaired in a most essential part. That the chair needed a division of another kind, however, was only too evident. The lectureship embraced not merely natural history proper, but geology, palæontology, and mineralogy,—a range of acquirements far beyond the compass of most men, and assuredly much too wide to be treated, with any approach to fulness, in the curriculum of a single session. A proposition to divide it, so as to allow the purely natural history portion to be undertaken by one man, and the geological part by another, was therefore a wise and liberal one, and it would have been well for the University could the Government of the day have been persuaded to carry it into effect. But to divide the existing

chair, with no pecuniary resources save the class fees, would have been a truly suicidal policy. Forbes, knowing the temper of the Government, protested against the scision, and had fully resolved, if it were carried out, to relinquish at once and for ever his design to form a great school in Edinburgh.

There was another reason for deferring his trip to Scotland, the death of his grandmother in the Isle of Man. But he must be allowed to state it in his own way. To Mr. Thompson he wrote :—"Family affairs demand my presence in the Isle of Man to-morrow week, so I will go to Liverpool to work a day with Macandrew, and one with Price, on Saturday next. I go to see if there be any chance of saving any of my fields, for in the Manx Almanac I figure as proprietor of three or four estates. I fear, however, that I can't preserve even a pig-stye, having no money to pay off mortgages. Still, for the sake of my brothers, I must look to matters, for I am now head of the family, since my father, not bearing his reverses, has left his country for good. All he left me was the parchment pedigree of my grandfather, so that I am officially installed chief of all the Manx Forbeses, who, I fear, unless better luck attends them than has done, will become extinct, and perhaps could not be so more appropriately than in the person of a palæontologist."

On the 24th November, the *Travels in Lycia* were published, in two well-printed octavo volumes. The joint shares which Lieutenant Spratt and Professor Forbes had in this work, are sketched by the latter in a letter to his friend, Captain Graves, to whom the book

was dedicated. "The introduction," he says, "is Spratt's, combined with an addition of my own, in the shape of a short history of discovery in Lycia, which I inserted for the benefit of the public, to show them what had been done before Fellows' time. It is gravely told, and conceals nothing. The first chapter is entirely mine; the remainder of the first volume is based on Spratt's; indeed, mostly his manuscript slightly altered. The more important descriptions, and the anecdote parts, I entirely re-wrote in my own fashion, in order that these should be quotable parts. In the second volume, the first chapter consists of my introduction, and notes to poor Daniell's last letter. The second is by Spratt, very little altered. The natural history chapters are my own. The Greek inscription appendix was drawn up by myself, acting under good advice, and not published till submitted to competent persons. I drew the coins under Sharpe's eye."

The work was received at the time in a manner highly gratifying to the authors, and it has taken its place as an authoritative text-book for the geography and natural history of those regions of Asia Minor which it describes.

The dedication of these volumes to Captain Graves, formed only one of many ways which Forbes took to express his regard for that able seaman and most excellent man. His letters to his old commander are full of the most affectionate feeling. Each of them tells of some common friend whom he had seen, and to whom he had given all the last news from the East, or of some influential circle in which he had mingled, perhaps with

a Lord of the Admiralty in its number, into whose ear he took good care to say a kind word for the "Beacon" and its inmates. There had been not a little discussion, too, in London circles, with regard to the doings of the "Beacon," when procuring the Xanthian marbles, and the part which Commander Graves took in that expedition had been much misrepresented. His young naturalist, however, proved himself a stanch ally, and stout combatant in the Captain's cause, doing much to counteract the sinister reports that had gone abroad; and now, in the Lycian volumes, the name of Captain Graves was placed in the front, followed by a generous tribute to his services in the cause alike of science and art, as well as to his unfailing kindness to the authors. Forbes would not allow the old relation to disappear, and delighted to regard himself as still one of the "Beacon's" crew, to whom, when he wrote to Captain Graves, he used to send his best wishes, sometimes mentioning five or six by name. Even by the naval authorities, his connexion with the Eastern survey was looked upon as not wholly severed. "I am still regarded as *your* old naturalist," he wrote to Graves, "and am consulted about all new expeditions."

The visit to the Isle of Man did not finally settle family matters there, though, in the end, part of the property was secured. Forbes returned to London about the 8th of January (1847), and found a series of bulletins from his friends in Edinburgh, reporting all the variations in the aspect of affairs.

Professor Jameson was still ill, but not worse than he had been, and there seemed little probability either

that he would voluntarily resign his appointment, or that illness and inability would compel him to do so. On the 13th of January, Forbes writes to Mr. Thompson :— "I send you a fresh note from Balfour, received this morning, which, I think, puts the true state of the case so far as the Town-Council is concerned. I have no doubt that my interest is well attended to by B. and Goodsir. I do not think it advisable to go to Edinburgh at present. Matters are not ripe enough to run the risk of being out of the way from here. I could not go without permission, and do not feel so sanguine about the Edinburgh chair as to risk what I have here yet. I have, however, written to Horner, who has promptly, and with all his energetic kindness, written to Lord Minto, the Lord Advocate, and Solicitor-General, and the Lord Provost, so that my intentions will be well known. You will see that Fleming cannot act in ignorance of my movements. If he comes forward, I dread my chance. His claims for a *Scotch* chair, I freely admit to be before mine, though I maintain he is too old now for a professorship. My hope lies in his honesty, for after resigning a University chair for the Free Church, it would be a memorable instance of 'ratting' if he quitted the Free Church for a University chair. I have said nothing yet to De la Beche, lest he should meddle either way in the matter. He will be rather surprised at my wishing to leave London. My doing so may do good to others, for it will call attention to the state of scientific appointments in the Metropolis. Even supposing things at their best here, the utmost I could look for would be a salary of £500, for which my liberty, time, and comfort must

be entirely surrendered, and all prospect of working out my researches put an end to. Such, however, I fear, must be my fate, if I cannot get out of it. The more I see, the more I am convinced that no man should take up science as his profession unless he has some independence to fall back upon. Had I £200 a year of my own, the King's College chair, with such an income in addition, would be pleasant enough. But such cannot be. However, I hope before summer that my course, one way or other, will be settled, for I cannot work with comfort to myself or with justice to my task, till I am more settled in mind and body than I now am."

Ten days later, he writes again of the exertions of his friends, and adds,—"For my own part I am anything but sanguine, but, of course, will make a struggle for it. I wish it were settled either one way or other, for with the consciousness that I can do nothing effectual in my present position, and the doubt of ever getting a better, I feel and fear a tendency to grow indifferent to science."

On February 4th, he wrote to Captain Graves :—

"I go to Ireland on Survey duty next week, and hope to see your brother and Thompson ; Patterson, perhaps, also. Things are in a sad way there ; people dying on all sides, of starvation. After having seen such a country as Asia Minor in great part uncultivated, yet capable of growing corn for half the world, it is terrible to think of death by starvation when there are such means neglected of preventing it.

"I am hard at work ; perhaps too much so still. But there is a prospect of Jameson resigning the Edinburgh chair this summer, and I am, consequently, very sharp on

the look-out. If I get it, it is not impossible some autumn day may find me at your side in the Archipelago; as, once in that chair, the working-out in full, and in famous form, of the natural history researches in the 'Beacon' will become my chief task, and I will then have plenty of time for it. As it is, I get no rest, but am stoned to death by fossils. My health, however, is, though not all right, much better than it was last winter."

All the well-laid schemes of the candidates were in a few weeks frustrated, for the veteran naturalist at Edinburgh neither died nor resigned, but rallied from his illness, and kept his professorship for seven years after.

While these and other letters on the same subject were passing to and fro, an event occurred in London of some interest in its relation to Edward Forbes, and of considerable importance in the history of the Geological Survey. The members of the Survey met together in the Imperial Hotel, Covent Garden, on the 25th of January, and there entertained their chief, Sir Henry de la Beche, at dinner. Professor Ramsay took the chair, and the company consisted of the staff of the Survey and Museum, along with one or two men of science who had been conjoined with them in part of their work. The evening passed very pleasantly away in joke and song and humorous speech. Such social interchange of thought and feeling served to bind the staff firmer together, and unite them more closely to their chief, and it was then resolved that every year thereafter the Survey should hold its anniversary dinner, with Sir Henry as perpetual chairman. Forbes and

others used to write serio-comic scientific songs for the occasion, and these were inscribed in the album of "The Royal Hammerers." The pages of this volume are adorned with sketches by Sir Henry himself; Forbes wrote out some of his songs in it, with borders of funny elves and gnomes, and creatures that never existed save in his own fertile imagination. These dinners are still part of the established institutions of the Survey,—and long may they continue so.

A few days after this dinner (viz., on February 3d), another incident occurred to show how casually our clubs and societies are sometimes formed. At a meeting of the Geological Society a discussion ensued upon a paper by Mr. Prestwich on the *Tertiaries of the London and Hampshire Basins.* Forbes, in the course of his speech, remarked with regret how much information on this subject lay scattered in different books and periodicals. Mr. Bowerbank followed, and, on the spur of the moment, suggested the establishment of a Tertiary Publishing Society. The idea immediately found favour, and afterwards, at tea down stairs, it was expanded into a proposition to found a society for publishing plates of fossils, not from the Tertiary deposits only, but from all the British formations. This was the origin of the Palæontographical Society.

Early in March the Palæontologist of the Survey began his tour of inspection in Ireland. He had much to see there, not only for clearing up obscure points in the geology of that country, but as material to aid in the explanation of part of Wales. After a series of excursions he returned to Dublin, and wrote to Pro-

fessor Ramsay:—"27*th March.*—I returned last night from my provincial tour. My work here so far has been as follows:—1*st*, Unpacking and examining the collections made since I was here before; this is still in progress: 2*d*, Going north at the head of a great army of fossil-fish to Lord Enniskillen's, in order to compare and name them for the Report I am drawing up on the Hook section fossils. This I did successfully, and could not have done it without the aid of Lord E.'s. collection, which is magnificent and in exquisite order. Then at Florence Court, I went to seek out the localities for the encrinite heads, which come over to England continually without anybody knowing how they are found. This I did. Also to examine the sections through the carboniferous series there, which are very complete, and to work out *pentremites*, in order to understand better our *sphæronites;* all which was satisfactorily done. I then went to Armagh, and met Oldham there by appointment, to go over the fish quarries, and observe their relation to the Hook. Thence northwards to the Silurian district of Pomeroy, to bottle up knowledge for our Welsh reports; satisfactory also. Yesterday we got back. All this was out of the area at present under survey; but it is in vain to write and print on districts till the outlying places which afford keys to geological secrets be looked to. Hence I hope Sir Henry will consider my tour justifiable."

"51, St. Stephen's Green, Dublin, 1*st April* 1847.

"Dear Wilson,—Your very welcome letter and poem (which I admire much, but will write fuller

comments on very soon) had to travel some way before they found me, for I have been three weeks in Ireland, and most of the time in the interior, on geological duty. The sight of your handwriting made me ashamed of my neglect in not writing to you for so long, as I ought to have done; but now putting off writing from want of leisure, at another time from want of spirits, and at a third from hopes of seeing you in person, and having the delight of conversing, have successively prevented me answering the letters both of you and of other very dear friends.

"My health is much better than it was, and could I have rest and time to think and read (and write also), I am sure it would come quite round again. The vexation of incessantly being obliged to write imperfect work annoys and frets me. If Jameson retires, I shall make a desperate effort to get amongst you again, as in that lies almost the only hope I have of working out the heap of material I have accumulated, and the philanthropic views which I hope I may never abandon. Next screed shall be anent poetry, and soon. Ever, dear Wilson, your affectionate friend and *frater*,

"EDWARD FORBES."

"I am in a land of misery and tears at present, hence the dull tone of this short note."

A "screed anent poetry" was, with Forbes, a favourite form of correspondence. As, perhaps, the most interesting specimen he has left, the following letter to Mr. Patterson may be appropriately quoted here:—

"DEAR PATTERSON,—Anent your notion about the

connexion of natural history and poetry, I here put down a few sentences. Morren of Liège has lately published a volume of poems which I have not as yet seen, but I am told that in the preface to the book he maintains the identity of the naturalist and the poet, and of their respective pursuits. You should see and get hold of this.

"Now, here is my theory of the matter, jotted down rapidly and without sufficient forethought. Most naturalists, if not all, may be arranged under the following classes :—

"A.—Such as perceive analogies more vividly than they do affinities.

"B.—Such as perceive affinities and can define them, but are weak in their perception of analogies.

"Var. *a*.—Have scarcely any just perception of analogy.

"Var. *b*.—When analogies are pointed out to them, perceive them readily if they be true.

"C.—Such as remark differences without the power of recognising whether they depend on the absence of analogy or affinity.

"D.—Such as having a vivid sympathy with the beauty of natural objects, seek in the details or history of those objects the gratification of that sympathy.

"E.—Such as combine an apparently intuitive (really logical) perception of analogy with the power of accurate recognition of affinity, and both with the intuitive perception of ideal form, = beauty. The greatest leading minds belong to this class. There is a passage of this class into B,—as there is also of A into D.

"EXAMPLES IN ILLUSTRATION.

"A.—Oken, Swainson, and amongst literary men, Sir Thomas Browne.

"B.—Ray? Yarrell, Jussieu, Richardson, Hooker, Fleming.

"C.—Gray, Klein, Gmelin.

"D.—Waterton, Hugh Miller, Johnston? and among poets, James Montgomery.

"E.—Aristotle, Linnæus, Robert Brown, Goethe.

"Passage of B into E.—Cuvier, Owen, J. Goodsir, Gaudichaud; Macleay leaning to A.

"Now, the minds of class E are essentially poetic, or rather in the highest degree æsthetic.

"Those of A are not necessarily poetic or æsthetic, but are sometimes so.

"Those of D are poetic always, but not necessarily æsthetic.

"Those of B are rarely ever poetic, sometimes moderately æsthetic.

"Those of C are neither poetic nor æsthetic.

"Those belonging to the transition between B and E are usually highly æsthetic, though not poetic.

"The power of throwing the thoughts into verse is, with the naturalist, an *accident*, to whichever class he may belong.

"Such is my solution of the problem—in trying to unriddle which I have passed the last two hours, till now I hear the clock strike ONE! and 'tis bed-time. Being this evening (in consequence of a slight degree of feverishness which warns me to resort to pills and powders

ere next week begins) in a dreamy state, the preceding two semi-metaphysical pages may be, I fear are, incomprehensible. So, if you can't make them out, you may put them in the fire."

On the same day on which he sent the last quoted letter to Dr. Wilson, he wrote to Mr. Thompson that he had been urged to give a lecture at the Royal Institution during the spring. "I have written that my subject shall be 'The North Atlantic.' In this case I will make the lecture half on Löven's researches confirmatory of mine, and half upon the economic application of my work, and the true way of inquiring into the fisheries. This will give me an opportunity of trying to do Ball that justice which he will not do himself."

The lectures at King's College were fixed to begin this year, on the 28th of April, and Forbes returned to prepare for them. He had no sooner arrived in London, however, than he was ordered off to Devonshire, where he vibrated for a week and a day between Axmouth and Lyme. Yet it was a week well spent, as he obtained, for the first time, a true notion of the Lias formation. On getting back to London, he wrote to Professor Ramsay :—

"I regret quite as much as yourself that you and I did not meet at Lyme. Sir Henry recollected that it would have been better so, too late; in fact I left with him at a moment's notice, and we had done our work there almost as soon as we had breathing time. I hurried away back on account of my college lectures which now commence; had it not been for them I would have joined you.

"My visit to Lyme gave me a thoroughly clear idea of the Lias, and the succession of its fossils, which I much wanted. I now can picture to myself all the events of its formation. At the base of it I saw the so-called White Lias, which, *so far as I have seen*, seems to me to be essentially different from the lias, and possibly the terminating strata of the triassic series. I broached a notion to Sir Henry, from what I saw, that the red marls were formed in a great salt inland sea (a sort of Aralo-Caspian), during the last state of which the white lias was formed; that the bed was then either elevated and converted into land, or depressed and turned into a part of the ocean, when the liassic fauna came in. This notion is not merely hypothetical; the fossils of the white lias (very few in species) suggested the idea; they are curiously representative of the existing Caspian fauna. Such a state of things would account for the general and hitherto almost unaccountable unfossiliferous character of the Trias in our area, and for the extinction of the last traces of palæozoic fauna. Rest assured there is something in this spec. like a clue, where a clue is wanting. Much research, however, would be necessary to work it out. I wish much that we could make a tour of the coast sections of the south of England together. It would be most instructive to both of us, and beneficial to the Survey. If the governor went with us, so much the better, as he knows the line."

On May 14th, he lectured to the Royal Institution "On the Natural History features of the North Atlantic." In this lecture he pointed out the zoological regions into which that part of the ocean is divisible, and the geo-

logical changes to which the present disposition of such provinces is due. He referred also to the simultaneous and independent observations of Professor Löven of Stockholm, who had arrived at similar conclusions as to the distribution of marine animals, and the nature of those geological revolutions by which the different species had gradually come to occupy their present areas. The latter part of the lecture was employed in showing some of the economical bearings of the subject. Forbes dwelt especially on the conduct of deep-sea fisheries, and showed that the results of scientific research had never, in this country, entered into any scheme for the extension and improvement of that part of our national industry.

He refers to this lecture in a letter to Professor Ramsay:—"On Friday night I lectured at the Royal Institution. The subject was the bearing of submarine researches and distribution matters on the fishery question. I pitched into Government mismanagement pretty strong, and made a fair case of it. It seems to me that at a time when half the country is starving, we are utterly neglecting, or grossly mismanaging great sources of wealth and food. I have lately rummaged through every document, official and non-official, that can be laid hold of on this matter, and more wonderful blindness on the part of statesmen, etc., could not have been discovered. It happened that the night before my lecture the question rose accidentally in the House, and Ministers and members displayed as much ignorance of the case as ever. Were I a rich man, I would make the subject a hobby, for the good of the country, and for the

better proving that the true interests of government are those linked with and inseparable from science.

"Sir Henry brought Phillips of the Woods with him, and I had a fair sprinkling of political people present, who have urged me to press the matter."

Before the close of the botanical lectures at the College, the British Association met at Oxford, and Forbes went down to attend it. At this meeting his papers were:—

1. On the families of British Lamellibranchiate mollusca;—the object of this communication being to explain the classification which he intended to adopt, in conjunction with Mr. Hanley, in the preparation of their work on the British mollusca.

2. Notice of Dredging Researches in progress.

The Red Lions met as usual, and mustered strong this year. On the 24th (the first day of the sectional meetings), Forbes occupied the chair, and, on the 26th, twenty-four of them went out to see Blenheim, twenty stowing themselves into the inside and on the summit of a stage-coach, while the remainder, who could not find room, kept up with the main body in a phæton.

One of the most memorable features of this meeting, however, was the discussion in the Natural History Section on the nature and relations of the extinct Dodo. Forbes, though he did not take part in it, had, nevertheless, a lively interest in the controversy, and, some weeks afterwards, he sent to the *Literary Gazette* a long ornithological romance containing a humorous account of the debate. The subjoined verses, which

have been quoted by Dr. Bennett, are the best in the song :—

SONG OF THE DODO.[1]

Do-do ! although we can't see him,
His picture is hung in the British Museum :
For the creature itself, we may judge what a loss it is,
When its claws and its bill are such great curiosities.
Do-do ! Do-do !
Ornithologists all have been puzzled by you.

Do-do ! Monsieur de Blainville,
Who hits very hard all the nails on his anvil,
Maintains that the bird was a vulture rapacious,
And neither a wader, nor else gallinaceous ;
A do-do ! a do-do,
And not a cock-a-doodle-doo !

Do-do ! John Edward Gray, sir,
Doubted what Mr. de Blainville did say, sir,
And held that the bird was a vile imposition,
And that the old Dutchman had seen but a vision—
A do-do ; a regular do !
And didn't believe one word was true.

Do-do ! alas for our wisdom !
Strickland has come to the judgment; and his doom,
From a hole in the head, and a bone with a ridge on,
Is that our *rara avis* was only a pigeon ;
Our do-do, only a doo,
A regular doo, like a turtle-doo.

Do-do ! alas ! there are left us
No more remains of the *Didus ineptus*,
And so, in the progress of science, all prodigies
Must die, as the palm-trees will some day at Loddige's,
And, like our wonderful do-do,
Turn out not worth the hullabaloo.

By the beginning of July, Forbes was back again to London. On the evening of the 3d, the Metropolitan Red Lions gave a dinner to the Prince of Canino, and other distinguished foreigners, Dutch, Danish, and Russian, who had been at the Association meeting. Cook Taylor occupied the chair, with Forbes as vice,

[1] He pronounced this word as *doo-doo*.

and the evening rolled merrily away. The northern *savans* went into the fun with great heartiness, but the nephew of the First Napoleon appeared not quite to understand the uproarious mirth of the men whom only a few days before he had seen engaged in such grave and earnest debate in the scientific assembly at Oxford.

The King's College lectures ended on the 17th July, and Forbes immediately left London for a few days. Before starting he wrote to Belfast :—"My lectures ended yesterday, and I mean to take a run out of town to-morrow for a week, as a breathing excursion. I go first to Lady Hastings, and then by Thursday or Friday to James, to get a day's dredging, and to look to two or three common species of molluscs of whose animals I am not quite sure. Since you left town I have got my British shells and the bivalves of my Ægean collection stuck on tablets and put in consultable order. This will be a great step towards giving away duplicates in future."

He was now preparing for the early publication of his great work, for which he had been amassing material since his boyhood—the History of British Mollusca—the first pages of which were issued at the commencement of the following year. His summer excursions, when not purely geological in the service of the Survey, had now a constant reference to the elaboration of that work. Sometimes they were given to dredging, sometimes to the comparison of the shells in various cabinets throughout the country, and sometimes to conference with other labourers in the same field of science. In such an undertaking his well-known geniality of nature,

and the universal friendship which it had won for him, independently of his acknowledged permanent merits as a naturalist, contributed not a little to his progress. There was little jealousy excited by the announcement that Edward Forbes was about to prepare a comprehensive history of the Mollusca of the British Seas. On the contrary, he met with the most cordial assistance. It was acknowledged that by none could the task have been more fitly undertaken, and thus cabinets that would have been closed against another were at once thrown open to him. For four years the preparation of this work occupied a large portion of his time; it brought him into still closer connexion with the naturalists and collectors in all parts of the kingdom, thus strengthening former friendships, and weaving the ties of not a few new ones.

On the 28th July, after his return to London, he wrote to Mr. Ramsay:—"I spent a few days very delightfully and very usefully with Lady Hastings, who is one of the most excellent (and without exception the cleverest) woman I ever met. Her husband too, Captain Henry, is an exceeding nice person. He is an amateur chemist, she a 'fossilist,' and knows her work, and both are enthusiasts in music and drawing; both playing and singing, and painting admirably. There is not the slightest grain of nonsense or affectation in either, so you may guess my pleasure in becoming intimate with such trumps, even though they be—only in name—aristocrats. Lady Hastings has the finest collection of Speeton clay fossils I have ever met with. I have made a full abstract of them for the use of our establishment, a

synopsis in fact of many more species (twice as many) as in Phillip's work. This will come in for Yorkshire. I have carried away a new oolitic star-fish too, most conveniently for my report on that subject.

"Now about Welsh movements. By the end of the next week I hope to clear off much work in hand here, and then, if you so agree, to start for Wales. My wish is to go *via* Bristol to look to the museum and collections there, for sundry things we require before printing some matters on hand. Thence I would take packet for Swansea, where I must, if possible, for my own use, see Jeffrey's collection. And from thence I would proceed any way you may direct, and meet you at any point you may appoint."

On the 15th of August he reached Dolancothy in South Wales, and met there Professor Ramsay, who having sprained his foot, had been for some weeks laid aside from field-work. They remained for a fortnight in the pleasant family-circle of Dolancothy. During the day

they rode out with the ladies in short excursions round the neighbourhood, or the two men of science rambled out together, Mr. Ramsay on his pony, and Forbes walking by his side, or Forbes set out himself to sketch, or to learn the art of pike-fishing, or to join in a game of quoits. The evenings passed away in pleasant chat, Forbes as usual busy with his pencil, making portraits of the family, or drawing the quaint grotesque

figures which seemed ever lurking in some corner of his brain, ready to jump forth whenever, in an odd moment, a pencil and a piece of paper lay before him.

By the 30th of the month, Mr. Ramsay found himself sufficiently recovered to renew his field duties, so he and Forbes started off on a tour of inspection. They first went to Llangaddoc to see the Sawdde section, where every subdivision of the palæozoic rocks is seen, from the Lower Silurian up to the Devonian, and thence on the same day they reached Llandovery. For eight weeks they continued to flit from place to place, comparing rock section with rock section, and thus by a careful examination of the fossils in the field, bringing the Silurian strata in different parts of Wales into closer harmony with each other. From Llandovery they went to Builth, thence to Pen-y-bont, over the hills by Bedd-ugre, and down into the valley of the Ithan; away over to Kington to see the limestones and trap-rocks of Nash Scar, and then by Old Radnor Hill and Presteign to Ludlow. Thence they went north to Church Stretton, and remained there for a fortnight, making many excursions to neighbouring localities: Wenlock Edge with its rich fossiliferous limestone, the Cambrian ridge of the Longmynd with its encircling conglomerates, Caer Caradoc, Lee Botwood, Winstanstow, and All Stretton, where lived a pleasant family under whose roof the evenings were sometimes passed.

On the 1st of October they reached Bishop's Castle, and remained there till the 9th, geologizing as usual when the weather permitted. The snug little inn at Cherbury was their next resting-place, from which they made

several excursions, one in particular to Montgomery, where, in walking through the churchyard, the sexton pointed out the grave of a murderer whom he had buried with his own hands twenty-six years before. The prisoner, it appeared, had protested his innocence, and declared that the grass would never grow over his grave, a prophecy, however, which had not come true. The sun shone out brightly as he was led to execution, but no sooner had he set foot on the scaffold, than "it thundered and lightened like mad;" a sure proof in the eyes of the sexton, that the man had been righteously condemned.

From Cherbury they started on the 18th for Welshpool, and spent the following day in a long ramble among the igneous rocks of the Breidden Hills, then to Meifod on the banks of the Vyrnwy, in a quiet Welsh valley, down which they drove to Oswestry. A few excursions in this neighbourhood completed the tour. On the morning of the 26th, the two friends parted company, and Forbes returned by Ruabon to London.

Of these excursions Mr. Ramsay writes:—"There never was a more delightful companion. It was on such occasions that his inner life best revealed itself. His knowledge was so varied, his conversation often so brilliant and instructive. And he would take as well as give, for no man ever better appreciated the work of his less gifted coadjutors. Some of the happiest hours of my life were spent in conversation with him on these excursions, and many a grave talk and hearty laugh did we enjoy together, when, after a hard day's walking and hammering, we returned for the evening to our wayside inn. He would write some of his poems then, and hand

them to me for criticism. When in the field he would sometimes become abstracted, and stopping now and then, pencil down in verse the ideas as they rose in his mind. He was also constantly in the habit of making coloured drawings of remarkable geological localities. When we were alone together, he used to place me in the foreground, and abjuring the neutral tints in which I might be clad, to make up the picture, he would clothe me in red and blue, and place an imaginary damsel by my side, saying that I was the standard 'lovyer' in his pictures."

The remainder of this year was spent somewhat erratically. After leaving his friend in Wales, Forbes returned to London for a few weeks. During his leisure hours there, he began the preparation of a new Palæontological Map of the British Islands, which he had agreed to design for Mr. A. K. Johnston's Physical Atlas. The work was completed during the ensuing spring, and published in the autumn of the same year.

In this map, the area occupied by the several geological formations was laid down from the most recent researches. But it differed from all previous geological maps, in the prominence that was given to the palæontological features of the country. The names selected for insertion on the sheets were for the most part of geological interest. Besides this, localities remarkably productive in fossils were marked with distinctive characters to show the nature of organic remains; copious lists of fossils were inserted round the margin; especial reference was made to the more remarkable phenomena of the distribution of life during the glacial period, and the lines of depth traced

round the coast to mark as far as possible the several zones into which Forbes divided the British seas; lastly, he added eight large folio pages of explanation, giving at a glance, in a tabular arrangement, the main palæontological features of the British Isles.

Edward Forbes left town early in December, with the intention of first visiting the Staffordshire coal-field, where Mr. Jukes was at that time surveying; studying carefully some parts of the collection of Silurian fossils in Dudley, and then crossing to assist Mr. Oldham in the museum at Dublin.

"DUDLEY, 11*th December* 1847.

"DEAR RAMSAY,—You will see by the above date that I am on the tramp. I left London on Tuesday, with Bone for Wolverhampton, where we spent Wednesday with Jukes and Selwyn, examining fossil collections, and completing cystidean plates. On Thursday I left Bone to finish his drawings, and came to Dudley with the luggage by coach, and walked myself with J. and S. to see some geological points of much interest. A walk over the same line of country would, I think, be serviceable to you for your lectures as well as survey. The open coal works are very interesting, and the alternations of rocks among the slags of the great furnaces. . . . Yesterday, Bone and I had a long and most satisfactory day's work in the Dudley collection, and to-day, by the afternoon, we shall complete what we have to do, when he goes to London, and I on to do Oldham's job in Dublin, where I shall be on Monday morning. We have got the subjects of six new plates of Cystideæ here, all of great beauty and interest. My paper on the fossil star-fishes

is in Sir Henry's hands for the press, and the first part of the cystidean paper will be sent from Dublin. At the last Geological Society meeting, we had a most interesting paper by Sharpe, on the relation of the American and English Silurian fossils. I had occasion to pitch into De Verneuil and the French pretty strongly, in return for a side slap at me in the last Bulletin, where there is a long and very interesting paper by De Verneuil on the same subject with Sharpe's. In that paper he attacks 'certains géologues' who hold deep-water views about the Silurians, and maintains the American Silurians were all very shallow water beds, his chief argument being the so-called ripple-marks and fucoids! The result of Sharpe's work, however, confirms the deep-water view, and Lyell backs it."

Christmas found him in Dublin. While there, he sent a short note of hints to Mr. Ramsay, who had recently been appointed Professor of Geology at University College, and whose first course of lectures was about to commence. "The leading ideas of both Hutton and Lyell," he says, "are older than either, and must be culled from many sources. We find one in Strabo, another in Henry More, a third in Molyneux, a fourth in Leibnitz, and so on. In truth, *ideas* and *principles* are independent of men; the application of them and their illustration is man's duty and merit. The time will come when the author of a view shall be set aside, and the view only taken cognizance of. This will be the millennium of Science."

By the middle of January, the Survey engagements in Dublin were completed, and he returned to reside for

some months continuously in London. The paper on the fossil Star-fishes, though not yet published, was ready for the press.[1] It contained a synopsis of all the British fossil Asteriadæ, and a notice of the foreign species with which its author was at the time acquainted. The monograph of the Silurian Cystideæ followed the last paper in the *Memoirs of the Geological Survey*.[2] That remarkable order of radiate animals had only been lately recognised as occurring in Britain. A number of specimens having been procured from the Silurian rocks of Wales, Forbes, whose interest in the subject had been excited by the perusal of Von Buch's memoir, "Ueber Cystideen," undertook their investigation. His paper forms, perhaps, his most valuable contribution to the palæontology of the older geological formations.

In addition to these long and elaborate papers, the palæontological map of the British Isles, already noticed, still occupied him at intervals during the remainder of January, and part of February. His monograph of the British naked-eyed Medusæ, published by the Ray Society, likewise demanded not a little of his leisure time this winter. When completed, it formed a quarto volume, thoroughly characteristic of Edward Forbes, not only in its careful and succinct descriptions, but especially in the humour that creeps out again and again in his zoological details, giving an air of liveliness to what might seem sufficiently dreary reading. For instance, in referring to the alleged stinging property of an

[1] It forms a memoir of twenty-five pages, entitled, "*On the Asteriadæ found fossil in Britain.*"—*Mem. Geol. Survey*, II. part ii. p. 457.

[2] This paper occupies fifty pages of the second part of vol. ii. of the *Memoirs*, p. 483.

Oceania when applied to the eyes, he remarks:—"Not being ambitious of suffering stone-blindness by playing too closely with even the smallest Gorgon's head, I have never ventured to repeat the experiment, and prefer keeping my eyes intact, to thrusting medusæ into them. For such rash experiments, Ben Jonson's song might be paraphrased,—

'O do not wanton with those eyes,
Lest *you* be sick with seeing.'"

But besides all these scientific labours, he was busily engaged, in conjunction with Mr. Hanley, in the preparation of the numbers of the British Mollusca. "I am in the midst of work," he writes to Mr. Thompson, "having many things on hand, Survey memoirs especially; the Mollusca are but by-play. The medusæ are all on the stone, and colouring. My map of Great Britain for Johnston is out of hand, but not yet published. Our Piccadilly building[1] is rising fast, and Government must come to some conclusions about the posts there this summer, but I fear the state of the budget will not permit much to be done. In ten days, I shall have to make a hurried visit to the Isle of Man. My poor brother there must have his foot amputated. Fortunately one of my aunts has been most kind to him, and will not allow it to be done except in her house, and under her care. As nursing is half the battle, this may save him. I wish I had a home for him, and must try to make one."

On the 25th February, he lectured to the Royal Institution "On the Question in Natural History: Have

[1] The present Museum of Economic Geology, one end of which fronts to Piccadilly.

Genera, like Species, Centres of Distribution?" His object was to show that genera are not universally diffused over the world, but are gathered into certain geographical provinces, in which there is a point where the genera attain their maximum development, and whence they gradually diminish as we trace them outwards. The same fact was also pointed out as characterizing the appearance of genera in the geological past. They did not come in at once in their full development, but slowly, and by a small number of species, and then, increasing by degrees, reached their maximum, after which they gradually waned until their final extinction. He regarded it as highly probable that the point in geographical space where genera attain their greatest development, represents the point of origin from which the different members of the genus dispersed themselves.

The spring of 1848 is memorable for the wide-spread shaking of the nations that followed the revolution by which Louis Philippe lost his throne. A vague disquietude passed like a contagion through all classes in our own country. The day of the Chartist meeting on Kennington Common was anticipated as likely to witness a revolutionary outbreak, and measures were secretly taken by the Government to guard the Bank and other public buildings, and quell the insurrection by force. When such movements were going on in London, it would perhaps have been strange had no show of alarm been visible within the precincts of Craig's Court. Without pausing to consider whether a collection of stones would be likely to prove attractive

to a revolutionary mob, it was decided that the Museum had a good chance of being ransacked, and to guard against such a catastrophe, the Government hammerers were desired to arm themselves and defend their camp.

Edward Forbes had at first treated the whole matter as a joke, ridiculed the idea of a rising of the people, and laughed heartily at the notion of an attack on the collections at Craig's Court. His merry taunts on the preparation to resist the civil rebellion, procured him no good-will at head-quarters, but at the last he relented so far as to enrol himself with the rest as a special constable, and shouldered his baton in defence of his cystideans and trilobites.

On the morning of the day that was to witness the outbreak, the members of the Survey and of the Museum assembled within the building, which was then closed. There was a back-window of the Museum that looked into Scotland Yard, and here for a while Sir Henry was observed to be very busy pulling in the cutlasses that were handed up by the police authorities outside. Everything was now ready for a siege. The morning however passed away, and still the mob came not; the forenoon crept on, and all outside remained quiet. By degrees the besieged, finding no enemy, stole away from their general to see what was the real state of matters. They returned in the afternoon to report, and found that the Director had improvised an excellent dinner for the whole staff in his own room. This ended, they adjourned to the laboratory upstairs, and concluded this

warlike day by smoking an unlimited number of pipes of peace.

The month of April was spent partly at Efford with Lady Hastings, and partly in a geological tour with the surveyors in Hampshire and Dorsetshire. On the 19th, Forbes met Professor Ramsay and Mr. Trimmer at Lymington, whence they crossed at once to the Isle of Wight, spending the night there, and after an excursion to Alum Bay, returning to Lymington next day. The ramble westward was a pleasant one. Pedestrian tourists were rarities in Hampshire, more especially geologists, with heavy coats, pockets stuffed with specimens, and boots enveloped in mud. The landlord at Milford received the naturalists with not a little suspicion, and seemed evidently at a loss to reconcile their easy gentlemanly manner with the travel-stained state of their attire. Next morning, indeed, he could hardly refrain his surprise, when he found his bill not only paid, but paid well. Crossing the ferry they were charmed with the sight of Christ-church, a grand old pile, seen across a marshy moor, and an arm of the sea, with low hills beyond. Forbes sketched it on the spot. Then they worked their way, hammer in hand, along the cliffs to Bournemouth, thence to Poole Harbour, and so, by boat, to Studland, along cliffs of great geological interest, until they reached Swanage in time for tea.

Next day was spent among the cliffs of Swanage, a wonderful piece of coast-scenery—dark rocks worn into caves, with the sea-foam mantling around their base, a gloomy sky overhead, and white gulls wheeling across it.

Striking inland, they passed Corfe Castle, a noble ruin standing on a chalk hill at the farther side of a dark moor; then by Wareham to Dorchester and Weymouth. Three or four days were passed in this neighbourhood, one of them among the wondrous ruin of rocks that skirts the shore of the Isle of Portland, another along the shingle heaps of the Chesil Bank. By the 30th of the month, the necessary geological inspection had been completed, and the party broke up, Professor Ramsay remaining in Dorsetshire, and Forbes returning in the evening to London, where he arrived in time for the opening of the botanical lectures at King's College, which this year began on the 2d of May.

These lectures had long ceased to cost him trouble in their preparation. He had by yearly practice augmented his natural ease and grace of lecturing, and thus men whose tastes had but little of a scientific cast, often found their way to his class-room, attracted by the charm which he threw over his elucidation of vegetable structure. Men of science, too, loved to listen to him now and then; his markedly suggestive style of treatment serving as a stimulus to thought, and often casting a new light on questions with which they were already familiar. He used to tell of at least one specimen of another type of listeners. "At the commencement of one of his courses, he observed a gentleman assiduously writing notes day after day. He seized an opportunity of remarking to this individual that he seemed to be taking a great amount of trouble. Whereupon it was frankly explained to him that the supposed student had

been recently appointed lecturer on botany in one of the London Medical Schools, and knowing very little of the subject, found it convenient to deliver to his own students in the afternoon the lecture he heard Forbes give in the morning."[1]

[1] Dr. Bennett's *Memoir*, p. 18.

CHAPTER XIII.

THE GEOLOGICAL SURVEY CONTINUED—HIS MARRIAGE.

THAT Edward Forbes had, from his boyhood, an enthusiastic love for the gentler sex needs not to be told. The nymphs that float down the pages of his early note-books, amid scattered scraps of lectures and gaunt skulls and skeletons; the supplicating maidens of his place-books, seized by ruthless monsters, but delivered in the very instant of time by a tall, slim youth, evidently meant for the limner himself; the female faces, pensive with braided locks, or laughing among curls, that come up again and again in the memoranda of his London life, and in the jottings of his country rambles; above all, the endless amatory songs and anacreontics, and unfinished snatches of verse that form so large a proportion of his fragmentary papers,[1] show clearly enough

[1] One of these may be quoted here:—

Heart! be still, now idly beating,
Tell the tale of thy defeating,
'Tis not scorn that hath destroyed thee,
'Tis not beauty that hath cloyed thee:
'Tis thy fate,
Ever loving when too late!

Longing still for that bespoken,
Hoping still for pledges broken,
Wishing still where fate opposes,
Gathering thorns when grasping roses:
'Tis thy woe,
Heaven ordains it must be so.

Vainly we the gods importune,
Poets poor for better fortune;
So that ever blest and blessing,
Still caressed, and still caressing:
All our themes
Would no more be idle dreams.

Ye who at the welkin gazing,
Of new planets tell amazing:
Can ye not some world discover,
Where shall rest the hapless lover,
And his love,
Crushed below, be blest above. . . .

what, amid all changes, remained the under-current of his thoughts. Despite the dreamy countenances of many of his nymphs, and the high-flown style of much of, at least, his earlier poetry, the feeling was no mere sentimentality. The yearnings and longings of what he calls "the transition or caterpillar state" of bachelorhood, were graphically enough described from his own experience in the pages of the *Literary Gazette*. "What," he asks, "is the peculiarity of bachelorhood? It is the yearning after love returned, the craving for marriage, the longing for woman's companionship. Surround a bachelor with every possible comfort; give him the roomiest of bed-chambers, the most refreshing of couches, the largest of sponging baths; cover his breakfast-table with the whitest of table-cloths; make his tea with the hottest of boiling water, envelop his body in the most comfortable of dressing-gowns, and his feet in the easiest of slippers; feed him among the luxuries and comforts of the snuggest of clubs, do all these things and more for him and he will nevertheless be unhappy. He mopes and ponders and dreams about love and marriage. His imagination calls up shadow-wives, and he fancies himself a Benedict. In his dream he sees a fond and charming lady beside his solitary hearth, and prattling little ones climbing up his knees. He wakes to grow disgusted with his loneliness, and, despairing, vents his spleen in abuse of the very condition for which, waking and sleeping, he longs and pines."[1]

That one so susceptible of the gentler emotions, and so great a favourite in society, should have been in his

[1] *Literary Papers*, p. 220.

thirty-third year still unmarried, is a strong testimony to his prudence and judgment. He alleged, indeed, at that time, that all his life he had never been fairly in love, and that the furthest stage he had yet reached was hearty but qualified esteem. An impartial critic, however, would be apt to look on some of his pencillings as dictated by a warmer sentiment, and certainly much of his poetry would be received as good evidence against him. But be that as it may, he had been long anxious to marry. Two obstacles had hitherto lain in his way; in the first place he declared he had never met a woman whom he could esteem so thoroughly as to marry her; and in the second place, even if he had discovered the needed damsel, he had never enjoyed income enough to support her. If there ever arose in the heart of Edward Forbes a feeling akin to envy, it was at the sight of his comrades entering one by one into the married ranks. He watched his brethren of the old "oineromathic band" as each in turn formed a still closer alliance than that which they symbolized in their red ribbon and silver triangle. Among the "Red Lions," the frequency of the espousals filled him with concern. It is amusing to note how he chronicles these events in his letters, and how lugubriously he turns from a contemplation of the happiness of his friends to ponder the destiny of his solitary self. One marriage had been spoken of but was deferred, then spoken of again, and finally celebrated, and in moralizing on the subject, Forbes concludes with the hope, that as the lucky fellow had got fairly away at last, Providence would now take himself in tow.

The wish obtained its fulfilment much sooner than his most sanguine expectations had conjectured.

When visiting at a friend's house in Surrey, he met Miss Ashworth, daughter of the late General Sir C. Ashworth. It was a short visit, but long enough to make him a lover; at least, to bring him nearer to that condition than he would allow he had ever been before. "Had I time," he wrote, "I would fall in love; the charms being good sense, unselfishness, amiability, and accomplishments of rare quality." He met her again in London, each time with increasing regard. He seemed at last to have found the helpmate of whom, through these long years of toil, he had been dreaming. There appeared, too, to be a reciprocal attachment; and, though in alternate hope and fear, all went well. He began to build castles of delight, and fondly anticipated finding in a house of his own that rest and solace for which he longed. But, so far as his experience went, to form a wish had very generally the effect of defeating its fulfilment. Besides, if at last the philosopher had been caught, it was hardly to be expected that in his case the course of true love should have a special exemption from its proverbial roughness. And so it happened, that whilst he was dreaming and scheming, his friend had unexpectedly been called to accompany some of her relatives to Canada. The intelligence fell like a thunderbolt among his day-dreams. He must needs see her, however, before the departure, and plead, though with little chance of success, that she should remain in this country. It was vain to hope that the family arrangements by which she was tied could possibly be changed, and he returned

in despair. Yet he felt sure that the regret was not on his side alone, and in his farewell visit this seemed so evident that, after allowing a day or two to elapse, and finding, as he said, that his fit continued, he determined to offer marriage. Describing the events to a friend at the time, he wrote,—"This morning I plucked up courage to write my letter, telling her plainly how I felt, how I am situated, that I have no resources save head and pen, was as poor as proud, and offered her myself if, with all these drawbacks, she would have me." He received an answer the same evening, and immediately wrote :—

"DEAR RAMSAY,—It is now near twelve o'clock on Monday night [17th July], and though there is no chance of this letter going till to-morrow night, I cannot resist the temptation of writing the most important news in my existence to you, and first to you.

"I have won a wife!!!" [Here follows the sketch of a maiden offering her hand to a spectral lover, who, standing on one leg and flourishing the other in mid-air, waves his hat triumphantly aloft.] "To-morrow I shall probably be so dumfoundered with astonishment at my daring and success as not to be able to write at all. Ten minutes ago I trembled to open a note which Holmes brought from the Museum after hours, and which settled the matter. Never did philosopher make so bold a stroke for a wife."

The intended voyage was, with the full consent of Miss Ashworth's friends, at once abandoned, and preparations were made for the marriage, which, it was arranged, should take place as soon after the meeting of the British Association as possible. As for Forbes, it

may readily be imagined that his ideas for some weeks were none of the clearest. Fortunately, he had no very important paper to read before the Association, while the more pressing literary work of the Survey had been completed, or was far on the way to completion. By the end of July, however, he had made up his mind to leave London and spend some days in Mr. Macandrew's yacht, before visiting Swansea, where the Association was this year to assemble. From Milford Haven he writes to Mr. Thompson (August 3d),—"I left London on Saturday, tearing myself most unwillingly from the arms of love, but determined to do some duty in the dredging way before Swansea. It was, indeed, very necessary that I should get hold, if possible, of sundry animals before the winter, for the forthcoming numbers of the '*Mollusca,*' and this was my only opportunity. My dear girl—for I may call her so fairly now—is quite reasonable on such points, and fully appreciated my reasons. I joined Macandrew on Monday morning here. The weather until to-day has been unfit for the deep sea, but we have been well occupied exploring this Lough (for so it is) of Milford. Moreover, an account of our work here may tell upon the Welsh meeting, and stir up the leek-eaters. It has struck us to-day that a comparison of the list of molluscs found here with those of some similar locality at the other end of the Irish Sea, would be interesting. Strangford Lough is the case most parallel. Could you send me such a catalogue?"

At this meeting Forbes read:—1. "Notice of Discoveries among the British Cystideæ." This paper contained a brief outline of the subject of his monograph

in the memoirs of the Geological Survey, which was published at a later period of this year, and has been referred to on a preceding page (p. 430). 2. On some marine animals from the British Channel.

The Red Lions had a good muster this year. Forbes filled the presidential chair; and, after one of his humorous speeches, was crowned with a velvet cap, embroidered with the effigies of rampant red lions.

On the 15th of the month, while still at Swansea, he wrote :—

"DEAR THOMPSON,—This is the last day of the Meeting, which has been an admirable one both in men and matter, and I never knew the business of our section better, or the section itself better attended. I go to town immediately, to make preparations for being spliced. My love is at Lymington keeping residence for me. Everything goes on right."

On reaching London, he wrote again to the same correspondent, 25th August 1848 :—

"DEAR THOMPSON,—I ought to have written you before this, but a man in my condition is not *compos* for the time. I left Swansea on Friday, arrived in London on Saturday, did as much business as I could; started for Southampton on Sunday morning to see Col. and Mrs. Hay away; arrived just in time, and could not say that I was sorry, as their sailing left Emily behind. I then went to Lymington; to see Captain Rooke, E.'s uncle, at whose house we are to be married, came back on Wednesday, and have been hard at work getting business settled.

"We are to be married on Thursday next (Aug.

31st). The bride's uncle, Sir George Burrard, who is head of the family, will probably perform the ceremony. I expect Oldham over to be my assistant, as Ramsay is in Scotland, and most of my old friends have got married of late. Oldham comes as my colleague in the Survey. After a week at Bournemouth we shall go upon the Survey, which, being on the Llangollen and Snowdon districts, will suit well. No more at present. —Ever, E. FORBES."

After the marriage and the week at Bournemouth, the professor proceeded with his young wife to Llangollen in North Wales, to join the geological surveyors. In this movement he was regulated mainly by the prospect of having to request additional leave of absence during the winter, as the Chair of Natural History at Edinburgh seemed likely to fall vacant before many months could elapse. Instead, therefore, of making a long marriage tour, he resolved to reserve his holiday, and employ it in strengthening his chances of obtaining the long-coveted haven of rest in the north. In the meantime, he said he would "marry as an *ouvrier*, and go down upon the Survey a week after the wedding."

At Llangollen he took lodgings in a small farm-house, by the side of the lane leading over the hills to Glyn Ceiriog, which was afterwards known among the geologists as "Honeymoon Cottage." "I am squatted down here with my wife," he wrote, "in a very homely cottage with a cabbage-garden before it, and some very beautiful scenery. I have every reason to be more and more pleased with her every day."

The presence of Mrs. Forbes, and a sister of the present Local Director of the Geological Survey of Ireland, enlivened some of the geological excursions. Mr. Jukes, who was one of the surveyors of the party, has furnished the following particulars of this period of Forbes's life. "The wet weather," he says, "which was so continuous in Wales during all June, July, and August of 1848 had then given place to a fine autumn, and we had one or two delightful days among the hills and valleys north of the Dee. We crossed over the hill of Castell Dinas Brân several times. On one occasion being driven to take shelter under some of the arches of the ruin, Forbes dashed off a sketch in which Ramsay, Aveline, and I figured as brigands on the look-out peering over the crags. On another visit it was proposed that we should race down the north side of the hill. With the advantage of strong, hob-nailed country boots, I could run with ease down the declivity, assisting Mrs. Forbes to keep pace with us. Forbes himself, however, being shod with smooth-soled boots, had made slower progress, and when on reaching the bottom we looked back for him, we saw him advancing very deliberately, and in a fashion altogether his own. Squatting down with his hands on the ground behind his heels, and taking his knees over his shoulders, he hobbled down, partly on his hands and partly on his feet, with a queer rocking-horse motion, his lengthened and distorted face and thrust-out tongue peering out behind his legs. It was an admirable impersonation of the pucks, elves, and hobgoblins he so delighted to draw."

The requirements of the Survey never admit of a

lengthened sojourn in one locality, and Forbes found his married life not less nomadic than his state of bachelorship had been. After six weeks pleasantly spent among the hills of Wales, partly with Mr. Jukes at Llangollen, and partly with Mr. Ramsay at Llanberis, he had to cross to Ireland in the end of October to arrange the collections of the infant museum in Dublin. Mrs. Forbes, however, accompanied him, and remained with him during his stay in Ireland.

It would be hardly true to assert that Forbes had grown weary of his appointment, and that its duties became more irksome the longer they were performed. In point of fact, his natural temperament inclined him to the kind of life rendered necessary in the Survey, and had his course only been beginning, he would have entered most heartily into its pleasures and fatigues. But it must be remembered that he had joined the Survey to gain a livelihood, and be able to give himself eventually to the natural history work to which his previous life had been devoted, and which was undoubtedly his proper vocation. Can it be wondered then, that as years rolled on and no leisure came, as he had to work hard, and received wholly inadequate remuneration, as gradually he found himself drawn into new spheres of scientific inquiry, while those which he had marked out as the business of his life remained untrodden, and the materials he had collected lay waste and inaccessible,—can it be wondered that in these circumstances he should have longed to relinquish a post which required him to work the work of others, while his own, on which he believed his fame was to rest, could only be done fitfully

in stolen intervals, or not done at all? It was not discontent or restlessness that impelled him, nor even a desire for a larger income (though that would have been gladly welcomed), but the earnest wish to gain rest and leisure to complete what he had begun, and to build his reputation, not on the arrangement of museums and the determination of fossil species, but on original natural history investigations, and on the enlarged philosophic views of the connexion of the natural history sciences, which could only be worked out during a life of quiet and freedom.

Moreover, he complained of a want of definite arrangement in the Survey, that official intermeddling from head-quarters perplexed and hindered the usefulness of the service, and that a system of "red-tape routine" was employed in dealing with the Survey wholly at variance with the nature of scientific work.

The erection of the new Museum in Jermyn Street, to contain all the collections of Craig's Court, and the proposal to establish in the new building a training-school for geological science, seemed the dawning of better things. It was possible to develop there an unequalled range of educational advantages, and to create an admirable school of geology with its cognate sciences. Edward Forbes knew well the capabilities of this establishment, and fully admitted that it might be made one of the finest scientific colleges in the world. But he saw no prospect of a change of arrangement, or sign of greater order, and looked forward with not a little distrust to the scientific prospects of the future. "I have no intention of leaving the Survey," he wrote to Pro-

fessor Ramsay, "unless a better post turns up, and in the present state of Survey arrangements, should anything happen in Edinburgh, the temptation would be very strong; since both in a pecuniary point of view, and in freedom of movement, an appointment there would be superior. It ought not to be so, but unfortunately is so, nor do I see much sign of a better state of things here."

Again, while in Dublin, he remarked to the same correspondent, 1st December 1848 :—

"For my own part, whilst I would gladly stay with the Museum, if things were put in definite and dignified order, I am fully determined not to sit down there under any provisional 'adjustment.' I cannot seriously much longer give up all time for thought, travel, or reading; time which, in a pecuniary point of view, is worth twice as much as any income the Museum will give; unless something better be proposed than an indefinite position, a small salary, and vague hopes and promises. I see clearly as a man gets older he requires some stable position to maintain both his respectability and his comfort. I feel in London that the Survey and Muzzy[1] at present give neither, and every day have occasion to learn that my position there depends on my doings out of the Museum, and my post at King's College, whilst my really most important office, that of the Survey, gives no consideration, but is looked upon as a sort of clerkship. Now, this can be all remedied without making any extraordinary demands for money. The present salaries, considering the position the chief officers are supposed to hold, are of course insufficient; but no very great

[1] Forbes's contraction for Museum. It occurs frequently in his letters.

increase, with a well-considered plan of educational operations in the new building, would make them comfortable. I keep these views very much to myself, as I do not wish to impede the work, but am quite determined when we meet in town to bring things to a distinct understanding."

While at Dublin he found it necessary to visit the Isle of Man, to take steps towards the securing, if possible, of his lands of inheritance. He thus describes the results of the trip in a letter to Mr. Thompson :—

"My Manx business is, I hope, in train for satisfactory settlement. I wish to save certain estates, which would be small and unimportant in England, but which, in the Isle of Man, have a meaning beyond their value, having been in the Manx part of my family from time unrecorded. The only power I had over them was the preventing of their going to sale. In order to get rid of the embarrassment before I thought of getting married, I had made arrangements for forcing a conclusion respecting them, and bringing them to a definite sale, or rather such part of them as could be so treated. Acting under the advice of two relatives (one of whom has it in his power to leave me property by and by), I ventured on purchasing the main parts of these properties, and selling the outlying portions. As nobody would bid against me, though lots of purchasers came, since the Manx looked upon me as rightful owner, I had to take what I wanted on pledge of paying the mortgages, which nearly came up to the value of the land. What I retained in this way came to between £4000 and £5000, to be settled in six months' time."

This sum was secured through Mrs. Forbes's trustees, and the property thus remained still in the family of the Manx Forbeses.

Before the end of the year the professor had returned with Mrs. Forbes to London, and the Christmas week was passed with his mother-in-law at Sandgate in Kent. He would not furnish a house in town; the uncertainty whether he was to remain in the Survey, or to obtain an early appointment to Professor Jameson's chair, forbade such a step. So that after Christmas, he returned to London, and contented himself with hiring a furnished house for six months, and breathing a hearty wish for the northern professorship.

The work of the winter, besides the ordinary duties of the Survey, embraced the preparation of a lecture for the Royal Institution, on the question whether new species have come into existence since the creation of man. It was given on the 2d of March, and is analysed in a letter written a day or two afterwards to Mr. Jukes: —"I gave my lecture at the Royal Institution on Friday evening. Subject, 'Have new species appeared since man's creation?' It is trying how near one can go to the fire without burning one's fingers.

"*Argument.*—We have no positive or available evidence of new species having appeared within the human epoch, for the increase in the lists of species depends on the increase of our knowledge; and the assertions of Crosse, etc., about the creation of animals by electricity are rubbishy.

"What then can we say on the question?

"I propose a test not yet applied; viz., Certain

areas, presenting all the capabilities for becoming zoological and botanical centres of creation, have been formed since the termination of the last pre-Adamite period, *i.e.*, since the glacial epoch.

"*Ex.—Terrestrial.* Britain, north of Europe.

Marine. Baltic, Mediterranean.

"Do we find the population of such areas members of special centres of creation, or colonists from older ones?

"*They are all colonists and emigrants from older centres.*

"The presumption, therefore, is, that new centres (and, consequently, species) have not come into existence since the commencement of the human epoch.

"I don't intend to flatter the parsons by taking their dates for man's age, but mean fairly to state that I speak of the epoch of man's advent *geologically*, and am quite as ready to admit that it happened twenty thousand years ago as five thousand.

"The above is the more practical part of my argument. The more transcendental is as follows:—

"Centres in time are analogous to centres in space (or in other words, provinces in time are regulated by the same laws as provinces in space).

"*Question.*—Is man a member of the last organic province in time, for if so, he need not have been the last member, and species might have appeared after him?

"*Argument on this point.*—The members of the present animal (and vegetable) population of the world are members of a centre in time, which had its point of creative maximum anterior to man's coming.

"Man's appearance a unique geological fact. Man

not a member of the last centre of creation, but a unique being and concentrated act of creation equivalent to an entire province in himself.

"The steps of this part of the argument too long for a scribble.

"*Conclusion.*—That the probabilities are in favour of no creations after man.

"That the creation of man was a final act, and the *great purpose* to which previous creations tended.

"That such a view accords with the dignity of position and moral and social stand, taken by man in the world.

"The whole lecture springs out of my last on generic centres, and is one of a series, which I mean one of these days to print in the shape of a volume of essays, "On the Mutual relation of the Natural History Sciences."

The Museum in Jermyn Street had now so far advanced as to allow the boxes and hampers that had been lying for years in Craig's Court to be at last unpacked. The arrangement of the fossils in the galleries of the new building continued to form a chief part of Forbes's survey duties up to May of the following year. He had begun too the preparation of illustrations of British Organic Remains as part of the Survey publications, and the first decade appeared on the 24th of May of this year. It was devoted to a selection of Echinoderms, of the orders *Asteriadæ* and *Echinidæ*.

On the 24th of June, Mrs. Forbes was prematurely confined of a still-born infant. Her health during the summer remained such as to give Forbes some anxiety, while he himself also was far from well. A short visit

to Mr. Austen of Chilworth Manor, Surrey, occupied the latter part of July, and served to send back the Professor with renewed energy to the dusty boxes in Jermyn Street. While at Chilworth he found time to superintend the packing of the fine collection of Devonian fossils which Mr. Austen had presented to the national collections in Craig's Court. This done, he left Mrs. Forbes under Mrs. Austen's care and returned to town, putting up at his old bachelor's quarters in Edward Street.

The fossils hitherto unpacked in the Jermyn Street building were chiefly from secondary rocks, but the list was in many respects incomplete. To augment it, and at the same time accomplish some important palæontological work among the upper oolites, Forbes wished to spend the latter part of the summer, and as much of the autumn as could be spared, in examining the secondary rocks in the field. One of the surveyors, Mr. Bristow, was engaged at the time in Dorsetshire, and Sir Henry de la Beche consented that Forbes should join him. It was the middle of August before this arrangement was carried out. In the meantime, having no prospect of being himself able to attend the British Association this year, he nevertheless commenced as usual beating up among his friends for papers for the Meeting. It was with great reluctance that he felt himself compelled to abandon all hope of being at the Association, for the Meeting was to be held at Birmingham, and apart from other attractions, the "Red Lions" would appear in great force to hold their festivities in the town where they first saw the light. But considerations of expense had sufficient weight to decide the matter. "To come from Dorsetshire up to

the meeting," he wrote to Dr. Percy, "would be too much of a journey, and too great an expense, so that I quite give up all intention of being at Birmingham. The expenses of furnished house-rent, etc. etc., in London, scientific societies, subscriptions, etc. (unless my salary be raised to a respectable sum, or some equivalent be given in time to enable me to pull up), will, I fear, never admit of my maturing family expeditions to associations. Having a great respect for Birmingham, as the birthplace of the 'Reds,' I cannot but regret that such *must* be the case." As the time for his departure for the south-west drew near, there seemed a possibility that the trip to Birmingham might be achieved after all. So he wrote again to Dr. Percy, August 15th :—

"I am still in London, and none the better of being so. Mrs. Forbes is staying with Mrs. Austen, near Guildford, and I trust that before ten days are over we shall be down with Bristow in Dorsetshire.

"If I come to the Birmingham meeting, I shall come alone. It will depend upon some business which must call me to London in September, and which I will endeavour to get so arranged as to suit my visiting Birmingham. In that case I will endeavour to get a quiet bed at the original 'Red Lion.' If I don't come, I will send not a song but a dirge."

Towards the end of August he left London, and proceeded with Mrs. Forbes to the Dorsetshire coast. On arriving there, he wrote :—

"West Lulworth, Wareham, Dorsetshire, 27*th August* 1849.

"Dear Ramsay,—You will see by the above address that I am down among the oolites, etc.

"Gapper[1] joins me this week, and Bristow and I meet in a day or two. This locality is, from what I can see, a fine place to make up our cretaceous collections for starting. But we have just come, and I can't say much on the geology yet. We are lodged in the smallest possible thatched cottage, which we have at the prodigious rate of twelve shillings a week. Gapper took it for us. We brought our own sheets and knives with us, and do very well. It is a most out-of-the-world sort of place, but with magnificent cliff scenery almost at our door."

It was still doubtful whether the law business which necessitated his presence in London would be arranged before the meeting of the Association. In this uncertainty he had received, and been forced to decline several invitations from friends in Birmingham who wished him to accept their hospitality during the meeting. "I cannot make a family excursion," he said, "and to leave my wife in this out-of-the-world place would not be fair." A few days, however, after his arrival at the coast, he wrote to Dr. Percy :—

"*September* 10*th*.—As there is a prospect of the time for my private business in town suiting the time of the Association meeting, I can now say that I will be there. I shall leave this to-morrow afternoon, but must be in London all Thursday. I will come to Birmingham by the early train on Friday morning, and will drive to the reception rooms, and there leave my bag till I turn up quarters. I write this to set your mind at rest about my coming, and to ask you to enrol me in whatever party

[1] One of the fossil-collectors of the Survey.

you and Henry go with on Saturday, *i.e.*, if you visit the caves at 'Dudley by water.'

"Mrs. Forbes visits her aunt at Lymington whilst I am away. She sends best regards. Give mine to Mrs. Percy."

The papers which he read at this meeting were :—

1. On a remarkable monstrosity of a *Vinca*.
2. On the varieties of the Wild Carrot.
3. On the Genera of the British Patellaceæ.
4. "On Beröe Cucumis, and the genera or species of Ciliograda which have been founded upon it;" a paper in which he described the occurrence of egg-like gemmules on different parts of the Beröe, and pointedly dwelt on the varied appearance of the animal when producing these gemmules, its changes of form and colour being so great that somewhere about fifteen species, distributed under four if not six genera, had been constructed by naturalists out of this one creature.

The "Red Lions" met as usual, and celebrated with great effect their tenth anniversary. Forbes never failed to chant at their annual dinner at least one new song, and that which he contributed to this meeting was called the "Song of the Beröe," suggested, doubtless, by the direction given to his thoughts during the preparation of the paper just referred to.

He returned immediately to Dorsetshire, and wrote to Mr. Thompson, October 4th :—

"I write this from our rural (surveying) retirement, where my wife and I are ensconced in a very minute thatched cottage, out of the way of the world and everything else. You will have heard from Hyndman, probably, that I was at Birmingham. Having business to

do in London at that time, I killed two birds with one stone, and went to the Meeting; leaving Mrs. Forbes on the way at her uncle's, Captain Rooke, at Lymington.

"The Meeting was a very good one, and went off very well; the natural history Section was fully attended, and altogether there was not the slightest symptom of a decline in the prospects of the Association. Sir Robert Peel did not show, and the honours of the neighbourhood were done by Lord Wrottesley, and well done.

"I am hard at work when the days are rainy, and in the evenings with the Mollusca, to do which I have brought books, specimens, etc., all down with me. I find, however, that I have forgotten to make a note of what Patterson says on the consumption of Limpets in Ireland, and wish to refer to it immediately. Could you kindly state in a few words the purport of it (and the figures), as I should not like to omit it.

"We shall be here till the middle or end of November, perhaps later. The coast scenery is very fine and well worth seeing, and the natural history and botany very interesting. We are close to the sea-side.

"If Maguire murdered me he has certainly hit you off to a nicety in the portrait. I am to sit again."

At this time his friend and colleague, Mr. Jukes, married, and to Mr. Ramsay, who sent a description of the wedding, Forbes wrote, October 7th:—

"DEAR RAMSAY,—We are very much obliged to you for the picture, so well drawn, of Jukes's wedding, which must have gone off famously. The best wish we can give is, a similar one to yourself. I hope you kissed the bridesmaids.

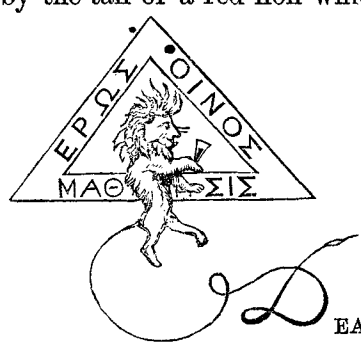
"Where is Jukes and his Missus? We want to write to them.

"Bristow seems determined to finish this country before starting, and as the Purbeck side is comparatively easy, may do it before Christmas. In one of the bays near here there is a fine clear section right through the Dorsetshire cretaceous series, and the beds below down to the Kimmeridge. We mean to go over it together, bed by bed, and construct a vertical table, with the distribution of fossils minutely on it. Gapper is hard at work with me.

"Living in a cottage with a wife of one's own, and no ceremony or callers, is such a happy state of existence that I feel sure Jukes has done right, and wish you resolved to do the same. Looking over some old scraps of mine a day or two ago, I came on a poem you have never seen, and send you it.

"With best regards from Mrs. Forbes, ever yours, E. F."

To Mr. Jukes himself, Forbes sent a congratulatory epistle, beginning with an illuminated initial letter, formed by the tail of a red lion which stands in the centre of a triangle — a characteristic blending of the old "oineromathic" idea with that of the more recent "Red Lions."



"Lulworth Cove, near Wareham, Dorset, *October* 19, 1849.

DEAR JUKES, and brother benedictus, — I take infinite disgrace and shame to myself

for not having before this written to congratulate you on entering among the ranks of the blessed. This is the more disgraceful on my part, since it is now above a year since I have tasted the happy cup of matrimony, and have found it grow sweeter every day. When a year of your married life shall have rolled away, you will find the same sweet taste increasing, although now, just as I did at your period of development, doubtless, you fancy that you could not be happier than you are. I congratulate you, old fellow, on your choice, and wish every possible accumulation of felicity on you and your wife, for many a long year to come. I wish —— could or would join our ranks, so that he might be a happier man than he is, longing as he does daily to take to himself a wife.

"Ever since Brummagem, I have been in Dorsetshire, among Purbecks and Portlands, chalks and greensands. The country is extremely interesting, and very picturesque. We are located in a cottage about one-fourth the dimensions of that which we inhabited at Llangollen, just big enough for me and my wife and maid to sleep in. We wait upon ourselves, and do the cooking amongst us, independent of pickling mushrooms, making ketchups, and pickling samphire, which occupations are the chief amusements of the village. There are no talkable people within ten miles, except a coast-guard officer, and a pleasant parson, three miles off. Now, having told you our state and condition, I hope, when you have a spare half hour, to hear of yours, and with best respects to Mrs. Jukes, remain ever, dear Jukes, affectionately yours, "EDWARD FORBES."

The scientific results of this residence in Dorsetshire are not the least important of Edward Forbes's contributions to palæontology. He proved that the Hastings sand contained fossils which linked it with the superposed chalk, and that the Purbeck strata, which had hitherto been classed with the Wealden, really belonged to the Oolitic series. He showed, moreover, that these Purbeck beds were capable of a threefold division, each of the groups being characterized by a distinct fauna; that the lines of demarcation between these groups were sharp, and yet were not lines of physical disturbance, while lines of disturbed beds showed no accompanying change of organic remains. He also made the important discovery that air-breathing mollusca lived at the period of the Purbeck beds, and inferred from them the probable existence of mammalian remains. He announces his discoveries in successive letters to Mr. Ramsay. Thus, on October 28th, he says:—

"DEAR RAMSAY,—You are such a long way off, that it seems impossible to write to you, or I would have answered your last before now.

"Gapper tells me that you mention coming this way in November. What are your plans, for I would gladly avail myself of the opportunity of going over the sections, etc., with you, if it be your intention to run over Bristow's work, as to do so would be a great help towards my full understanding of the fossils. If that were arranged any time 'before Christmas,' I have plenty to do hereabouts, and in Swanage (whither I must move) before you come, and when you come, I would break up my camp, wherever it might be, and Mrs. F.

would go to Lymington to visit her aunt, whilst I was on the Survey with you. Write me your notions.

"I am very well pleased with the results of my work here, so far, and very glad, for our Museum and Survey's sake, I came. The 'geology of England' may be 'done' by the old fellows, but it is not overdone yet. I have been working over every section of the Purbecks in the district, creeping over the beds with glass at eye, looking to the minutest traces of life and its changes, in those curious fresh-water strata. As the tracking of change in fresh-water beds has mainly to be made by observation of *Cyprides*, and such almost microscopic forms, nothing but personal inspection can give the clue. So far, I fancy, I have made out a complete change in the sets of forms of minute animal life in the different series of fresh-water beds which are separated by marine or estuary beds in the Purbeck. Moreover, I have found no fewer than seven species belonging to existing genera of fresh-water *pulmonifera* in these beds (species of *Lymnea*, *Physa*, and *Planorbis*),[1] a race of animals, the (supposed) non-existence of which during the secondary

[1] Those air-breathing gasteropods were found in a dark shaly stratum or dirt bed, from eight inches to a foot in thickness. Forbes justly dwelt with emphasis on this discovery, which was indeed one of the most interesting made in his day. He remarked at the time to Mr. Bristow, that if ever mammalian remains were found in the Purbeck series, it would be in this stratum lying between the middle and lower series. Since this prediction, Mr. Brodie, and after him Mr. Beckles, have disinterred the remains of reptiles and insectivorous mammals. See *Quart. Jour. Geol. Soc.* vol. xiii. p. 261. An amusing song written by Forbes for the "Red Lion" dinner at Ipswich in 1851, cautions geologists against reasoning too much on Negative Facts, and contains the following reference to the Purbeck discoveries mentioned in the text:—

"Down among the Purbecks deep enough,
A *Physa* and *Planorbis*
Were grubbed last year out of fresh-water stuff,
By Bristow and E. Forbes.
(Agassiz just had given his bail,
'Twas adverse to creation,
That there should live pulmoniferous snail,
Before the chalk formation.)

epoch has called forth not a few prematurely wise comments in geological works. I have also found two, if not three species of the genus *Valvata*, hitherto only tertiary and recent. These are palæontological results of some value. The end of this week's work has resulted in a little discovery in these beds of considerable interest, and very unexpected. I have found a thin band of shales of marine origin in the midst of that part of the freshwater series which comes between the 'cinder' bed (oyster band) and the *corbula* bed, filled with a well marked, and of course new, species of *Pecten*, reminding one in the most striking manner of the *Pecten papyraceus* bands in the coal formation, and for which a parallel was wanting.

"Is Sir Henry going to remain in town all this autumn?

"As my wife sends a line herewith I won't give her regards.—Ever, etc., E. F."

To Mr. Van Voorst he writes on 6th November:—

"I take up one of those rarities, a fair-sized sheet of paper, to write in reply to your last, and to make sure of writing a fair-sized letter.

"It is a great pleasure to hear of the good effects of Wimbledon air upon your body, and of the fattening thereof. The Dorsetshire sea air has had a like effect upon me, and I burst a button or two every three days. By this time I intended to have been moving Londonwards, but geological work of such fresh interest has turned up within the last month that I am loath to leave till it is done, and probably will not get back till some time in December. We are very happy and snug

in our little cottage here, and, I fancy, abstinence from dinner parties and all the luxuries of town, with early hours for bed-going, is getting me a new lease of good health. The places here on the coast are wonderfully healthy, so much so, that to paraphrase the Yankee jest, "the people have to move to the other side of the country when they wish to die.'"

"10*th November*.—DEAR RAMSAY,—Since I last wrote you I have been thinking and dreaming of nothing but Purbecks, and will end, if I go on so, by growing into one of those slender columns of Purbeck marble which adorn old monuments in old cathedrals. Last week I worked over the Ridgeway section and quarries about Upway with Bristow with most satisfactory results. I shall rile Ibbetson terribly by telling him what he missed in his section, which, besides, runs the Portlands far into the Purbecks. The exact division between the two I have made out precisely both here and at Upway. In all the sections there is a precise line, where out-and-out marine beds come in contact with out-and-out fresh-water beds. Of course such a succession implies an interval in time. The nature of the beds at contact, for the first time, has been demonstrated by fossils beyond question. I now find my marine 'pecten-bed' everywhere, with many more marine fossils in it. My list of Purbeck invertebrate species, is now between fifty and sixty, an enormous fauna, for what in the main is a fresh-water and estuary series. The published lists enumerate twelve. I am measuring up the beds and making a minute section.

"The best part of the work is probably to come. From

what I have found here, it seems almost certain (strange as it may appear) that Fitton and Mantell constructed (in the Swanage district) lower greensand out of Hastings sand, weald clay out of the Purbeck marble series (my upper fresh-water), and Hastings sand out of my "upper marine" sandy beds ! ! ! Bristow applauds the idea, and says his measurements will back it. We shall see presently. What a triumph it would be for old Webster's memory !

"I have written to Sir Henry about these results. He urges remaining to complete them for the present.

"Best regards from my wife.—Ever most sincerely,

"EDWARD FORBES."

"25*th November*.—DEAR RAMSAY,—This is Sunday night, Survey letter day, and I am sitting all alone by myself over a fading fire, and holding my nose, because of a dead rat which is being laid out under the floor somewhere, in consequence of the women having laid out poisoned bread and butter for the beasts—more shame to them ! You will ask why sitting alone ? I am sorry to say for a very sad reason. By this time I intended to have been working away at Swanage and nearly done. On Sunday and Monday, Bristow came to go over the Purbecks with me here, and compare notes. On Tuesday I was getting my bag ready for a start, when my wife was suddenly taken ill, and has been in her bed ever since with fever—very alarming and severe till Thursday night, but the doctor I sent for got her round, and she is now fast recovering. I hope she will be able to move by the end of the week. She got your letter yesterday, and was greatly pleased at hearing.

"When you say that the line of division between the Purbecks and Portlands is exceedingly well marked in the Isle of Portland, you speak of the supposed line (I thought the same here for the first two months), as marked by the dirt-beds and physical features. One of my points is proving how far *exactly* the Purbecks extend downwards, and the result is, that all the so-called "*caps*" are Purbeck without a question, the fresh-water beds with Purbeck fossils lying directly upon the Portland beds with marine fossils, though strangely alike in mineral character and consolidation. Of this I have satisfied Bristow. I fancy the result will be that in colouring Portland Isle, *all* must be coloured as Purbeck on the map; not a thin coat merely, but good fifteen feet of Purbeck all over. I have made a series of drawings, to show how this affects the scenery. There is a very curious physical phenomenon in the lower beds of the Purbeck here, possibly noticed by Webster, but I have never heard of it. It is the most singular mince-meat smashery of about eight feet of shales and chert-bands, causing no interruption in the fauna, and lying between undisturbed beds. It does not occur at Upway, but is very striking at Durdle, Lulworth, and Worbarrow, an extent of seven or eight miles. It is difficult to understand such a break-up between quiet beds of the same series.

"I have just made another great find in the fossil way, viz., *Gyrogonites* (*chara* seeds) in the fresh-water limestones here. They have hitherto been only found in Tertiary fresh waters. It certainly is wonderfully strange that, whilst there has been so great a change in

the marine invertebrate fauna of the oolitic times, as compared with the present, that of the old Purbeck fresh-water beds is such, that, were it now revivified, it would quite accord with the existing state of things; or, if we had not sure evidence, by superposition or rather infra-position, it would be quite impossible, *à priori*, to assert that the Purbecks were not Tertiaries. These considerations open out long vistas of reflection.

"The thickness of the Purbecks here is within a foot or two of 150 feet.[1] In old Conybeare's day they were reckoned at 300—I don't know how, and don't think that they are thicker than I have seen them. Sir Henry and the Dean[2] (if my notion be right) make them only forty feet in this district, which is far under the mark, but easily accounted for as some of the sections are imperfect, the top-beds being squeezed out in a line of fault, whilst they reckoned the thickness from the dirt-bed below. The sections at this place are so clear that there can be no mistake.

"Reeks writes me that the Museum has moved bodily at last. I hope this will be the prelude to an effective re-organization and to some plan for the use of the theatre, etc."

"*Dec. 2d.*—DEAR RAMSAY,—My last would cross your last (do not two letters when they *cross* produce additional notes or young letters?) I think I mentioned what my arrangements were, but, to make sure, send a line now. In a couple of days I hope to get away from

[1] The Lulworth Cove section is about 180 feet, as shown in Mr. Bristow's Section. *Horizontal Sections of Geological Survey*, sheet 56.

[2] Dr. Buckland, Dean of Westminster. See their Papers on the Geology of the Weymouth District. *Trans. Geol. Soc.* 2d Series, IV. 1.

this, as the doctor thinks that my wife will be well enough to move by Wednesday, and I am arranging accordingly. She has not, however, been out of the house yet, but has providentially got well much faster than I hoped. It was, however, a very serious illness. The tailor of the village was seized with the same fever, and died in six days though a strong man. Had I not given calomel in time, I fear to think of the result, the more so now, after receiving a letter from Oldham yesterday with an account of the sad death of poor Medlicott's young wife. He was married only about the same time with Jukes.

"My plans are these: Mrs. F. is to travel on by herself, resting at Lymington for three or four days, and then going on to Mrs. Austen for as many. I will pick her up as I pass by Austen's, and bring her to London with me, where we are to stay during Christmas with her mother, who has taken a house in St. John's Wood somewhere. In the meantime, she and her mother propose to run about looking for quarters, and when they have found desirable ones, to call me in to consult. . . . By the beginning of the year we hope to find a nest, either a home like last year, or (if such a thing can be got on moderate terms) a suite of rooms sufficient for all purposes, and seeing friends, as near the Museum as possible. During Christmas week I mean to be chiefly at work getting together illustrations and notes for my Royal Institution lecture, the subject of which will be a useful one to work up, as bearing upon my projected Purbeck memoir. One of our earliest calls during that week will be to see the Playfairs. . . .

"They say it is an ill wind that blows nobody good: my poor wife's illness has been no impediment to my work, but rather has added some very material data; for in consequence of the wet weather, the clays have been so thoroughly washed that some beds in which I was unable to find any but large fossils have now shown their small ones, and very important they have proved as bearing on this investigation. I have found pulmoniferous mollusca in the highest beds—a point of consequence, since I now have them in the beginning, middle, and end of the series. During the last few days I have added the genus *Bithynia* (*i.e.*, *paludinæ*, with calcareous opercula) to the Purbeck, and consequently, to the secondary fauna. Strange to say, but agreeable with all else here, the species closely resembles an existing one. The end will be what I predicted in a paper on the subject in the *Annals of Natural History* nine years ago, —that we cannot employ fresh-water mollusca, as we can marine, to distinguish formations of different geological epochs; consequently, that we must depend on superposition almost entirely for determining the position of fresh-water formations.

"I have laid down my section with all the distribution, etc., and the nature of the water, whether salt, brackish, slightly brackish, or purely fresh, on the ruled railway paper—taking a scale of two feet to the inch, which enables the phenomena to be fully displayed. It looks very pretty, and will especially do so when clearly copied out. I shall be able to give the distribution of the vertebrata as well as the invertebrata. I have felt very great pleasure in this work, as it is the very best

example that could be given of the importance of minute palæontology applied to geology, and I hope the Survey will be pleased with it.

"My wife sends best regards. Ever, etc., E. F."

As arranged, Mrs. Forbes went to Lymington and he to Swanage. Two days afterwards he began to feel unwell, and mentioned the circumstance in a note to his wife. On the fifth day his illness had increased so much that he could only scrawl a few words, "Dearest love, come." Mrs. Forbes started immediately, and on arriving at Swanage late that night, found him very seriously ill with scarlet fever—the same disease which had attacked herself at Lulworth. He continued ill for two or three weeks, and was kindly attended by Dr. Charles Willcox, who first visited him as a brother naturalist, but on being shown to his room, found him in an alarming state of fever. The patience and gentleness exhibited by Forbes during this illness, as well as in every other illness of his life, were very great. He never complained, and seemed only to think of the trouble he occasioned, especially to his wife.

When sufficiently recruited he returned to London, and found that the Craig's Court household had transferred itself to Jermyn Street, where, as he said, nothing could be heard save "noisy hammers making ferocious music in the vasty halls of the Museum." Much had been done in his absence, and though a year or more might still elapse before everything could be completed, yet the rate of progress was rapid. "The Museum is progressing fast," he wrote to Mr. Thompson, "so fast that I dread having to make an election between it and Edinburgh before the

latter place is ripe, in which case I should be obliged, under existing circumstances, to take the former."

There was, of course, not a little in the way of arrears to be worked up among the fossils. The new light which his researches in Dorset had thrown upon the upper oolite, enabled him to proceed with greater confidence in the construction of the fossil lists. There had also been collected, under his own eye, an important series of fossils from the Purbeck beds and associated strata of the Dorsetshire coast, and these had now to be unpacked and examined. To save time by being not far from the Museum, he took a furnished house in Welbeck Street, Cavendish Square, and established himself there for the rest of the winter.

To be under the necessity of frequently changing one's place of abode is, for the most part, irksome enough, but especially is it so to the man of science who must needs accumulate books, papers, manuscripts, specimens, and instruments of various kinds, and to the success of whose studies undisturbed quiet is almost absolutely essential. With Edward Forbes, as with the other members of the Survey, this nomadic life was unavoidable. A large part of the year had, of course, to be passed in the field, shifting from place to place, according to the requirements of the Survey. The salaries were not adequate to the expense of a permanent town-house, and the winter months, which were usually spent in London, could only be passed in temporary residences. In Forbes's case it was even worse than with his colleagues, notwithstanding his wife's fortune, for his college lectures compelled him to be in town longer and during the most

expensive season, and sometimes he had to return for them even after he had gone down to Survey work in the country. Hence his complaints of the insufficiency of the salaries, and hence, too, one cause, though a minor one, of his anxiety to gain at last the Edinburgh professorship.

He had a strong conviction of the necessity for scientific men, in official stations, maintaining a high social position. His marriage, although it gave greater prominence to this feeling, certainly did not produce it. We have seen how exalted even in his student days were his notions about the intrinsic dignity of science. In the *University Maga*, for instance, the sentiment found emphatic utterance, and it gave tone to all the canons and aims of the "Universal Brotherhood." From that early period of his career on to the end, Forbes never ceased to proclaim by his conduct, as well as in words, that the pursuit of science was a high and honourable vocation, and that its followers were entitled to no mean place in the social scale.

Two other features in his character should be viewed in connexion with this high estimate of the dignity of a scientific avocation, and as explanatory of one of the features of his married life. In the first place, his love of society was intense, and from his earliest days it had been so. Unless when actually at work, he cared not to be long alone. Solitude was ever irksome, and when his work was over, he entered again with a deep relish into the society of his friends. In a lonely wayside inn, for lack of other company, he would spin long yarns with the landlord, or mingle readily with any knot of travellers that might chance to appear. Sometimes he was in

this way brought into odd situations. On one occasion, for instance, he was coming down the Rhine, and met, for the first time, on board the steamer some pleasant English companions. After dinner one of the party called for a bottle of wine; when this was discussed, another individual ordered a second, and so it went round. Forbes had barely money enough in his pocket to carry him to England, but on his turn coming he found it impossible to resist the temptation, and boldly called for his bottle. When the reckoning came, the tourist who sat next Forbes found to his dismay that he had neglected to cash some bills at the last town, and so had no funds. He communicated the fact to our naturalist, who, of course, warmly sympathized. Another member of the party, however, came to their relief, and advanced the requisite sum, only stipulating that they should meet him that day week in his chambers at the Temple. At the hour appointed they appeared, and found a smoking dinner prepared for their reception.[1]

The other feature in Forbes's character which should be taken in connexion with this love of society, and the desire to uphold the social influence of a man of science, was one which he himself would probably have been the last to admit. Over and above his conception of the abstract dignity of science, there ran through his life a suppressed instinctive consciousness of his own intellectual superiority. This feeling was never obtrusive. It manifested itself rather in deeds than in words, and only if his own position needed to be upheld, as when, on entering the Survey, he stipulated that none should control his actions

[1] This anecdote was related by Forbes to his intimate friend, Mr. Godwin Austen.

save the Director-General. His impatience under any intermeddling with what he considered his proper duty, and his frequent bursts of indignation at the "red-tape" routine which trammels the action of Government departments, sprang from the same source. But he never in his intercourse with others betrayed any consciousness of superiority, "except," says Mr. Jukes, "in rare instances under excitement, and then his kindness of heart, and cordiality of disposition, prevented its ever losing him a friend." His self-esteem, though strong, was thus completely subdued, and at no time obstructed the heartiest sympathy with others. There was no tinge of jealousy in it. He always rejoiced in the higher intellectual displays of his friends, taking a noble pride in them without caring, or even thinking for a moment, whether or not they surpassed his own.

During his bachelor life in London he had mingled freely in society, and his presence was everywhere coveted. But the hospitality of course lay for the most part on one side only. After his marriage, however, he deemed himself called on to make it, as far as might be, reciprocal. His strong social propensities, combined with the desire to maintain the independence of science, by keeping up a high social position of his own, induced him to live much in public, and to incur not a little expense. In so doing he went fully as far as prudence could justify. To augment his income he found himself compelled to undertake a vast amount of extraneous literary and scientific "hack-work;" even then, his receipts from all sources did not more than cover his outlay, and the time consumed in this way made sad inroads on his leisure.

The subject which he fixed upon for his lecture this spring to the Royal Institution, was, "The distribution of fresh-water animals and plants." A fortnight before the date of the lecture, he wrote to Mr. Thompson for information :—

"23*d February* 1850.—My object is to show that all we know of their distribution, goes to confirm the views I had previously put forward at the Royal Institution. My points are :—

"1*st*. With respect to fresh-water species; to show that whilst their difference can be accounted for mainly by causes now in action, there is still a residue whose present distribution must be referred back to epochs of geological change.

"2*d*. That natural genera of fresh-water animals and plants have as distinct areas of their own as species have. I illustrate this especially by a map which I have constructed of the distribution of Siluroid fishes.

"3*d*. That the formation of new terrestrial areas, in consequence of geological changes in the form of a country, and consequently of new systems of drainage, has always called forth the creative energy in a new type of form.

"4*th*. That when we study the distribution of fresh-water generic types in time, we find that in certain groups of animals (as molluscs) there has not been that variation of the type idea which we see in others as fishes. Curious geological considerations result.

"Now there is a point in connexion with the first of these heads upon which I want your advice as an ornithologist. The flora of the United States has, as

you probably know, a considerable number of plants identical with European species. When these are analysed, there results this resolution of the elements :—

"1. Species of the boreal-Scandinavian type, living chiefly on high mountains, and originating from the glacial-epoch flora.

"2. Species introduced by man without question.

"3. A few miniature forms, which may have either been transmitted along the coasts of the glacial epoch, or transported by currents at a later period.

"4. A considerable residue of species which cannot be referred to any of the previous heads.

"My business with you is about this residue No. 4. When I came to analyse them, I found that, with scarcely an exception, they were *aquatic* species. This is a very curious result, and the only way in which it occurs to me to explain it is, that this community of aquatic forms between the continents is due to the agency of migratory birds. But I should not like to speak publicly on the notion without hearing the opinions first of some able ornithologist, like yourself, who has worked the subject of migration. Will you then kindly give me your ideas on this text ?"[1]

The Botany Class this year was better attended than it had ever been. In a letter to Mr. Ramsay, Forbes remarks—"I am fatigued by my morning lectures ; I have a larger class than ever before, having no fewer than seventy-four students.

"The Red Lions met last week very pleasantly."

[1] His friend and colleague, Mr. Ramsay, who was present at this lecture, remarks that "Forbes never appeared to greater advantage. He lectured clearly and boldly to a large and attentive audience."

The summer, with its lectures, and fossil-work among the growing galleries of the Jermyn Street Museum, gradually wore away, and brought round again the meeting of the British Association, which this year was held in Edinburgh. Before leaving London he wrote to Mr. Ramsay, "I am coming up with my Purbeck story and the third Decade.[1] I hope you and Jukes will stand forward with good matter. The Geological Section will be a very different one from its usual condition. Neither Lyell, Horner, nor Sir Henry are going. Murchison is to preside; Sedgwick will be there. My impression is that the debates of the Section will be conducted by the younger men, and that a change in its aspect for the better will commence."[2]

The papers read by Forbes at this meeting were:—

1. On the Succession of Strata and Distribution of Organic Remains in the Dorsetshire Purbecks.[3]

[1] The Palæontological publications of the Survey were issued in Decades, containing ten plates each. The third part referred to above was devoted to the illustration of some forms of Asteriadæ and Echinidæ.

[2] This letter, like others written in his later years, has a characteristic signature. It was stated in a previous page that, when writing to a Brother, he often coined an adverb out of the triangle, and signed himself "Yours Δly." Here he carries the same idea to a ludicrous extent, actually metamorphosing a rampant lion into an adverb, with *ly* coming out of its mouth, as if he had said, in so many words, that he bore to his friend all the sympathy and good-will that burned in the breast of a real Red Lion.

[3] The true classification of the Purbeck strata, as shown in previous pages, was first worked out by Edward Forbes, in conjunction with Mr. Bristow and the fossil-collector, Mr. Gapper, during the latter part of the year 1849. The detailed structure of the group was then elaborated, and the original draft of the palæontological subdivisions still exists in Forbes's handwriting, and has been made use of by Mr. Bristow in constructing the vertical sections of the Purbeck strata (Vertical and Horizontal Sections of the Geological Survey.) The only account published by Forbes himself was this short paper to the British Association, as he reserved the full descriptions until those of the Tertiary fluvio-marine strata of the Isle of Wight had been worked out by him. Unfortunately for science, he died before either account was completed.

This short description, read before the British Association in 1850, was published in the Report for that year. In 1852, a small pamphlet on the *Geology of the Isle of Purbeck*, was written by the Rev. John H. Austen. That gen-

2. On the European species of Echinus, and the peculiarities of their distribution.

Leaving Edinburgh, after the meeting was over, he went with Professor Goodsir and Mr. Macandrew on a cruise among the Western Islands. They coasted along the rocky shores of Mull, Skye, and the Lewis, dipping the dredge or the tow-net as opportunity offered. The results of the cruise were of considerable value. They added not a few fossils, and nearly twenty living species, to the British fauna, while, at the same time, they obtained a valuable clue to the geology of the Hebrides in the estuary beds of Loch Staffin, and the discovery, for the first time in Scotland, of true Oxford clay.[1]

On reaching London again, he wrote to Mr. Ramsay :—

"JERMYN STREET, *September* 4.

"Instead of going direct from the Hebrides to Ireland, I came on here last week. I was anxious to see how my wife was, and to set work agoing in the Museum. I found the former much better than the latter. The Museum has not advanced an inch towards completion since I left. The man and the boy from Nelson's pillar

tleman had enjoyed the advantage of Forbes's company, and that of other members of the Survey, during many excursions in the Purbeck district. He has omitted to mention this fact, however, and to explain the close resemblance of his palæontological subdivisions to those previously made out by Edward Forbes. While alluding to earlier writers on the geology of Purbeck, he also omits to notice the paper published in the Report of the British Association. Forbes used to say, that he reserved his exposure of this pamphlet until his own memoir on the Purbeck district was ready for the press. But this memoir, as has been already remarked, was never written, and it appears only due to the memory of the great naturalist that these facts should here be put on record, more especially as Mr. Austen in a subsequent paper (read before the Purbeck Society, 9th November 1855), has again ignored the name of the man to whom science is indebted for the first clear exposition of the palæontological phenomena of the Isle of Purbeck.

[1] *Quart. Jour. Geol. Soc.* VII. 105; also Jameson's *Edinburgh Phil. Jour.* for October 1850.

seem to have removed here. There is nobody else in the shape of workmen, and everything is at a standstill; indeed worse, for the cases, having been built of green wood, in too great a hurry, are cracking in every direction. I am in despair. I fully hoped before the new year to have displayed a series of fossils from one end of the geological scale to the other. . . .

"I was very successful in the Hebrides. The examination of the Loch Staffin brackish-water strata will work in famously with the Purbecks. They are really oolitic, but not where Murchison placed them.

"I start for Dublin to-morrow, where I expect to meet Sir Henry.

"If you knew the delight of meeting a fond little wife, after a six weeks' absence, you would get married immediately. EDWARD FORBES."

After a series of hurried excursions for three weeks in Ireland with Sir Henry de la Beche, he returned to London at the end of September. Shortly after this, he paid another brief visit to Swanage in Dorsetshire, to clear up some points in the geology of the Purbeck strata, and then, coming back once more to London, settled down for the winter. Immediately on his return he wrote—

"JERMYN STREET, 21*st Oct.* 1850.

"DEAR RAMSAY,—I hear you have returned to the pool of Bethesda[1] to wash yourself geologically clean of the sins you may have committed in Ireland. My wife

[1] A village near the Penrhyn slate quarries, about seven miles from Bangor, is called "Bethesda."

has been intending to write to you for some time back, but in these days of marrying and giving in marriage, it is difficult to find out where any man is. She wants much to hear from you a full, true, and particular account of the dying words and confessions of Thomas Oldham, Professor ——, what the bride was like, where they went to, and how they mean to move about. Will you favour me with a screed directed to 76, Upper Berkeley Street, Portman Square, where we have just imbedded ourselves for the winter?

"I have much to write you anent geological matters, but will not do it till I hear how and where you are. The Museum progresses rather more rapidly, and there are signs of cases being in preparation.

"I have just been at Swanage, all alone, with very satisfactory results. I must go again, however, when Bristow is there, and perhaps you might manage, some time in January or thereabouts, to run down with me, and look at some points of the greatest consequence to British geology.

"With best regards from my missus, believe me, ever, etc., E. F."

The summer and autumnal rambles being now fairly over, and the surveyors having already shown symptoms of preparing to reappear within the bounds of civilisation (so Forbes spoke of their return to London at the close of the year), he could begin to address himself to the work of the winter. And truly he had undertaken enough to keep his hands fully employed. There was, of course, the fossil work in the Museum, which, in one

way or another, kept him at Jermyn Street every day. But besides the arranging and describing of specimens for the Museum, he had the "British Mollusca" to carry on, in conjunction with Mr. Hanley. Most of his letters to Mr. Thompson at this time are to a large extent requests for names and localities of shells known to that naturalist, and necessary to the completeness of the work. In addition to this, he found leisure in his evening hours to begin another little volume (which, however, he never lived to complete), entitled *The Natural History of the European Seas.*[1] Mentioning it to one of his friends, he said he "thought it would tell." Lastly, he accepted an offer of sixty guineas for twelve lectures, to be delivered at the Royal Institution once a week during the ensuing spring. He chose for his subject, "The Geographical Distribution of Organized Beings," and showed the grouping of plants and animals into distinct centres and provinces. He concluded the series in his own characteristic way, by pointing out the bearing of such natural history inquiries upon geology.

On the 26th November, an event occurred for which he had been anxiously looking,—his first living child was born, a vigorous boy, or, as he playfully styled him, "a young Red Lion, very lively and handsome, and exhibiting indications of considerable talent, especially that of making a noise in the world."

In answer to an inquiry after the health of the home circle, he writes to Mr. Patterson :—

"*Dec.* 9.—Your note of the 1st has only found its

[1] Completed after his death by Mr. Godwin Austen (whom he left his literary executor), and published in 1859. London, Van Voorst.

way here to-day, covered with post-office inquiries. Where did you direct it to?

"I am glad to say that my dear wife is going on as well as possibly could be wished, and that the little philosopher is pursuing the same even tenor of his way. Many thanks to you and Mrs. Patterson for your kind inquiries. . . .

"My lectures respecting which you inquire, will be delivered at the Royal Institution, but not reprinted anywhere that I know of.

"Next week I go to Ransome for his anniversary, [at the Ipswich Museum] and have promised to give a lecture on the occasion. . . .

"You like a good story. In the course of the anti-papist fever at present raging, the walls have become covered with inscriptions: 'No Popery;' 'No Wafer Gods,' etc. etc. But the climax was reached last week, when an indignant Protestant chalked up on the boards of the new Exhibition building—'No Remission of Sins!'

"With best respects to Mrs. Patterson and my godson, believe me ever, etc. E. F."

The winter passed away pleasantly in London, not, however, without its occasional trips to the country. Thus, in the middle of December, he carried out the intention, mentioned in the last extract, of going down to Ipswich to give a gratis lecture for the benefit of the Museum there, on its anniversary meeting.

"We had a very jolly party," he said to Mr. Ramsay; "Van Voorst, R. Taylor, Bowerbank, old Wallich, Mitchell, Lankester, and myself, went down to roar as London Lions.

Henslow had to be installed as their new president, and many jolly fellows were there. I stayed with Ransome, who gave a great dinner-party on Wednesday, when it was pleasant to see the bishop, four or five clergymen, and a bushel of naturalists, all dining at the table of a Quaker chemist and druggist. The new bishop (Hinds) is a very clever fellow, and a trump. . . . Yesterday morning, Ransome got a couple of carriages, and a party of us drove to Felixstowe, to see a section of the crag, which I was anxious to see, having never been on that formation. I have secured a heap of good things for the Museum. . . . Wife and baby all right.

"EDWARD FORBES."

In a letter to Mr. Thompson, he gives a pleasant picture of how time was passing with him during part of this spring :—

"*Feb.* 3, 1851.—DEAR T.,—Having a spare ten minutes, I take up my pen to write a line in answer to your last. I have had very little time for writing letters lately; even my evenings are spent, except once or twice in the week, hard at work at home,—one of the advantages of being a married man.

"Besides survey works innumerable (we are now busy with the arrangement of our collections), I have the preparation of my weekly lectures at the Royal Institution. A map of the distribution of marine animals for the new edition of the Physical Atlas, the 'mollusca,' and sundry other productions, some for fame and some for tin."

In this extract he refers to a contribution to the new edition of Mr. Keith Johnston's Physical Atlas. This

was his "Map of the Distribution of Marine Life," on which he delineated the distribution of the fishes, mollusca, and radiata of the sea into distinct geographical provinces; also what he called the homoiozoic belts or bands enveloping the globe parallel to the equator, characterized by the same or analogous species; a table of the zones of depth, with copious explanatory remarks in the text and other two diagrams, one to illustrate the doctrine of generic centres, the other to show how the British seas were probably colonized by their present races of molluscan and radiate inhabitants. The "sundry other productions" seem to have consisted chiefly of articles in the *Literary Gazette*, wherein his pen this year was wonderfully prolific. Thus in the number of that journal published on January 4th, he had an article on Professor Sedgwick's Discourse on the Studies of the University of Cambridge, and another on the Bon Gaultier Ballads. Again, on the 11th of the same month, he reviewed Cheever's "Whaling;" on the 18th, some volumes on Physical Geography. On the 15th of February he wrote an article on some works bearing on the reconciliation of the Chronology of Science and Revelation, which ends thus:—"If these gentlemen [the authors criticised in the article] persist in their endeavours to astonish Geology, they could not do better than join the Dean of York, a philosopher of similar opinions and attainments, and by putting all three of their heads together, they need not despair of forming a conglomerate, such as will be unequalled by any puddingstone in the long catalogue of known strata."[1]

[1] See *Literary Papers*, by Edward Forbes. Reeve, 1855, p. 136.

His Friday evening discourse at the Royal Institution was given on the 14th of February, the subject which he chose this year being "Recent Researches into the Natural History of the British Seas." In this lecture he went over part of his old ground, showing the relation of the present geological features of our seas to former geological changes, and the extent to which recent researches had increased the data from which the nature of these changes could be deduced.

On the 8th April, the weekly lectures at the same place came to a close. On the 21st of the month, Sir Charles Lyell, Professor Ramsay, Mr. Bristow, and Edward Forbes met at Southampton, whence they crossed to the Isle of Wight. The weather proved unusually wet, but they succeeded in examining in detail the succession of tertiary strata at Alum Bay. On the 24th they reached Lymington, and then passed on to the cliff-sections of Swanage. Two pleasant and instructive days were passed among the Kimmeridge and Purbeck strata of this coast-line, and on the 26th, Sir Charles and our naturalist returned to London.

CHAPTER XIV.

THE GEOLOGICAL SURVEY AND THE SCHOOL OF MINES.

DURING the spring of 1851, Edward Forbes found ample employment in the preparation of the Museum for its public opening. The Great Exhibition was to be inaugurated in May, and, in anticipation of the event, London had begun to freshen up her streets and public buildings. The activity thus occasioned was working such wonders as were achieved of old by that wizard who, by the spell of his magic, changed

> The cobwebs on a castle wall
> To tapestry in lordly hall.

No place showed more evident tokens of the potency of the charm than the Museum in Jermyn Street. The "man and boy" that had so excited our naturalist's ire were exchanged for a full complement of workmen. Everything was hurried on, and the arrangement of the fossils under Forbes and his assistants progressed rapidly. The chaos that had reigned throughout the building for so long gradually disappeared, and there emerged that systematic order and that artistic grouping which continue to delight the eye of every geologist.

The Museum was opened by Prince Albert on Monday the 12th of May. Among the many visitors most of the leading men of science in the metropolis were

present, and the meeting passed over apparently to the entire satisfaction of Edward Forbes and his brother officials. There was only one event that cast a gloom over them; Mr. Richard Phillips, who had for many years been chemist to the Survey, died the day before. His kindly unassuming disposition and his droll humour had gained for him a cherished place in the esteem of all his colleagues. With none was he a greater favourite than with Sir Henry de la Beche, who had, indeed, such a regard for him that, by the consent of all in Jermyn Street, the sad intelligence was carefully concealed from their chief until after the opening of the Museum. When the truth was known, however, Sir Henry fell into a deep melancholy from which, for a long while, nothing could rouse him.

In a former page of this Memoir (p. 447), reference was made to an intention that the Museum of Practical Geology, when arranged in the new building in Jermyn Street, should be made the basis of an educational establishment. Application had several times been made to Parliament from some of the mining districts to form a school for the training of mining engineers, and the teaching generally of those branches of science necessary to the proper development of the mineral resources of the country. The Museum of Practical Geology, originated by Sir Henry de la Beche, and augmented by the operations of the Geological Survey, was pointed to as the most advantageous nucleus for such a school. Accordingly, negotiations had been pending for some time between the officials in Jermyn Street and the Office of Woods. The opening of the

Museum had drawn public attention to the subject and accelerated the arrangements, so that during the course of the summer the lecturers were selected, the plan of instruction organized, and all preparations made for commencing a School of Mines in the following November. Mr. Ramsay, who held the office of Local Director of the Geological Survey, and was also Professor of Geology in University College, London, became Lecturer on Geology and its practical applications. Mr. Warrington Smyth, mining geologist to the Survey, took the department of Mining and Mineralogy; Mr. Hunt, that of Applied Mechanics; Dr. Lyon Playfair, that of Practical Chemistry; Dr. Percy, that of Metallurgy; and Edward Forbes, that of Natural History, as applied to Geology and the Arts. With such a staff of efficient teachers, and with the unequalled facilities offered by the Museum and its laboratories, it was hoped that the ensuing winter would bring up many students from the provinces, especially from the mining districts, in addition to the numbers that London could hardly fail to supply.

It must not be thought, however, that, in entering into these arrangements, Forbes had relinquished his intention of making a stand for the Edinburgh professorship as soon as it should become vacant. On the contrary, even when most active in promoting the organization of the School in Jermyn Street, he had little hope that there would ever be such an increase of pay, and diminution of official trammels, as to make the London post a comfortable one. So we find him looking wistfully northwards, and begging for news as to the probability of Professor Jameson's resignation. Thus in

the midst of the preparations for the opening of the school in November, he found time to write to Mr. Thompson that he had "had some kind letters from old Jameson," from whose liveliness he augured no likelihood of a resignation, and looked forward, therefore, to be at least two years longer in London,—an anticipation that was eventually fulfilled.

The meeting of the British Association was held this year in Ipswich.

"I go with Mrs. Forbes to Ipswich on Thursday" [3d July], he wrote to Professor Ramsay, "and remain till Monday afternoon. Playfair, Percy, and Hunt, I believe, are going also. The Reds are to have a great dinner there on Friday.

"I have two or three communications to make, some zoological. I want to exhibit my new map of marine distribution, with my proposed Isozoic belts on it.

"To the Geological Section I mean to make a statement respecting the result of my examination of the Crag Echinoderms; also a note calling attention to some of Logan's discoveries, and one announcing the presence of Devonian strata in the interior of Africa, north of the equator."

These papers were read with the subjoined titles:—

1. On the discovery by Dr. Overweg of Devonian Rocks in North Africa.

2. On the Echinodermata of the Crag.

3. On a new species of Maclurea from the Lower Silurian rocks of Canada.

4. On some indications of the Molluscous Fauna of the Azores and St. Helena.

5. On a new Testacean discovered during the voyage of H. M. S. Rattlesnake.

On the 4th of the month the Red Lions celebrated their anniversary as usual. After dinner a new red lion's head, apparently in convulsions of laughter, was placed behind the president's chair, which was filled by Edward Forbes. The Prince of Canino sat on his right hand, and around him were many fellow-labourers in science, who had not met since the previous Association Meeting.

He still retained his professorship of botany at King's College. After the lectures of this summer were over, he went with Mrs. Forbes to Paris, and remained there a fortnight, his chief object being to make inquiries on the spot among the scientific schools of Paris for the purpose of guiding the lecturers at the new School of Mines.

In the beginning of September, Mrs. Forbes accompanied him to the Isle of Man, whence he went alone, on Survey duty, to Ireland. To Mr. Thompson, he wrote :—

"DOUGLAS, ISLE OF MAN, *September* 7, 1851.

"DEAR T.—You will see by the above address that I am now in another quarter—nearer you than Paris. I am availing myself of a short holiday to show my wife my native (is)land. To Paris I went, partly on survey business, and partly because I got an invite for self and better half, on account of my being a sectional committeeman of the Exhibition . . . I have to go to Dublin from this, and possibly then for two or three days to Jukes', at Cork. Then I return to London to prepare my lectures for the Mining School. Playfair and I begin in November . . . . Ever, E. FORBES."

Of his visit to Ireland the following particulars have been furnished by Mr. Jukes :—

"My wife and I," he says, "were living at that time in the old vicarage of Monkstown, near Cork, and after doing some little work in the Palæontological Collections in the Museum of Irish Industry, in Dublin, he came down to me there to examine the fossils of Cork Harbour and the neighbourhood. He was then busy with his great work on the British Mollusca, and especially on that part of it relating to the *Limacidæ*. At that time he always carried a tin box in his pocket with half-a-dozen fat slugs in it, on the description of which he was then engaged. The vicarage, being an old damp house, was well adapted for a slug preserve; the kitchen and pantry were every night baited with pieces of turnip, or other delicacies suited to the limaceous appetite, and the prey diligently secured in the morning. Our Irish servant was horribly disgusted at these *sluggish* propensities of our guest."

They next visited one or two interesting localities for fossils; among the rest Kiltorcan near Ballyhale, in the Co. Kilkenny, where a remarkable series of plants had lately been discovered by James Flanagan, the fossil collector of the Irish Survey, who was examining the district with Mr. A. Wyley (since Geological Surveyor to the Cape Colony). "After inspecting the quarries in which the fossils had been found," continues Mr. Jukes, "we proceeded to Flanagan's quarters to examine the treasures he had there ready arranged for our inspection.

"They were certainly a very remarkable group; fronds two feet across of a large fern, since called by Forbes (provisionally) a *Cyclopteris*, with the specific name of

Hibernica; several stems of *Stigmaria, Calamites,* and *Lepidodendron,* or other similar plants, and a shell like our *Anodon,* three inches across, to which Forbes afterwards, in spite of my remonstrances, insisted on affixing my own inharmonious name as a specific designation.

"He exhibited and described them the following year (1852) at the meeting of the British Association, in Belfast, but, owing to the want of all system which then prevailed in the Survey publications, and the prohibition against making known our discoveries, except through these publications, no proper figures and descriptions of these fossils have ever been published. After a day spent in the examination of the organic remains, Forbes and I caught a train for Kilkenny, where we slept, and the next day went on to Kildare, where we parted, he for England, and I to return to my work near Monkstown."

On October 7th he left Dublin for England, but, before sailing, found time to write a note to Mr. Thompson.

"DEAR T.,—Your letter of the 28th has just been met by me here. I have been in Ireland since the 27th, and to-night go to England to meet my wife at Liverpool, and go to London on Wednesday.

"I have been on a survey with Jukes in counties Cork and Kilkenny geologizing. I hope Jukes will have some important matter—very new—on Irish Geology to lay before the Belfast meeting. He has determined to do so.

"At the same time I have been slug-hunting. . . . What Lyell wanted you to do at Lough Neagh with the willows, was, doubtless, to get a good section of the thickest trunks, and count their age. Macadam would direct you best as to geological deficiencies about Belfast.

But before going through some steady geological work in the field, I dare scarcely advise you to write papers. If you are in earnest about geologizing, take two or three months' hard work, learning the trade with the geological surveyors. To understand rocks in the field it is necessary to do this, or at least accompany some able practical geologist for many excursions.

"I must stop at present, having many things to do before starting.—Ever, E. FORBES."

On 14th October, after getting back to Jermyn Street, he writes to Mr. Ramsay, "I am now settled down here for the winter. There is no show of pupils yet, but we must make an effort as soon as the Exhibition is over, and when Playfair, etc., will be free for home affairs. The governor comes up to-morrow to see the last of the great show. Smyth is here. . . . I have just finished Hitchcock's *Religion of Geology*, a very remarkable book, written in unaffected earnestness, so much so, that, even where he seems lost in theological prejudices, one reads with pleasure. It is the best book I have yet seen for putting into the hands of sincerely pious people who have a dread of geology.—Ever, E. FORBES."

The School of Mines opened on the 6th November with an inaugural discourse from Sir Henry de la Beche. Each of his colleagues also delivered an introductory lecture; and, though Forbes at first had resolved "to begin plump with no introductory," he yet conformed to the general practice. In writing to Mr. Ramsay he thus chronicles the doings in Jermyn Street:—"About the Museum and School of Mines; on the whole we

have done as well as could be expected. There are seven *bonâ fide* matriculated students entered for the two years, and twenty or so occasionals, chiefly soldiers. Besides these we have a few ladies and philosophers whose tickets have been backed by one or other of us, so as to give them free admission to all the lectures. Add to these about a dozen pupils of the School of Design, who, according to resolution, are admitted free, on being recommended by their director. Playfair and I lecture to about fifty people so far, including some of our colleagues. I had fifty-eight yesterday at my lecture. The number appears to fluctuate, but we shall see. Hunt had thirty-six this morning, and that seems about his average. There are a few more occasional entries for chemistry and natural history than for mechanical philosophy. The audience is highly intelligent, both male and female, and the mining pupils seem an excellent class of young men. To some extent we are fighting with disadvantages, for the Woods and Forests, or rather Lord Seymour, do nothing to push us on; the districts that memorialized for mining schools have not sent a single pupil; and the uncertainty of the plans of the Exhibition people respecting the appropriation of the surplus, prevents men coming forward, and unhinges the public mind. Until that is settled, we don't know exactly where we are. All of us here are of accord that this should be the nucleus of any great economical college, such as is talked about, and that, if we don't form part of the plan, we must go to the wall. Lyell, as a commissioner, has had a private conversation expressly on the subject with me, and I

dined quietly with Sir James Clark for the same purpose, Lord Ashburton being there. Both Lyell and Sir James entertain the right view on the subject. Lyell is especially anxious, as he considers himself pledged by his former writings to oppose the spending of the surplus money in architectural displays, and to maintain that it should be spent in endowments and scholarships. Our building enlarged (not in the front, but in useful rooms at the sides) would fully serve all the purpose. . . . Of my lecture, though reported at length in the *Chronicle, Herald,* and *Post,* I have not got a copy. I forgot to buy any the day it was delivered, and could not get one the next day. But it is printing in full at Clowes', and I shall send you it as soon as I get it. My themes were :—

"1. Why Natural History is a part of the education of a school of mines.

"2. Why it ought to be a part of all education.

"3. How it is linked up with geology, and their mutual obligations.

"4. How a minute knowledge of it may bear upon practical and money-making inquiries, illustrated by examples.

"5. Its relations to the Arts.

"I like your plan much. Playfair's lecture was excellent, and did him infinite credit. Hunt's very good. —Ever, E. FORBES."

He had fully resolved to carry into the Natural History Class of the School of Mines the principle of field-excursions, which he had introduced with so much success among the botanical students of King's College. In the course of his lecture he remarked, "In conducting the business of this class, I look forward to the

holding of field-excursions, regarding them to be quite as essential as lectures for the instruction of the student, who, to benefit by his studies, must become a practical fossilist, and learn to observe carefully fossils *in situ*, and appreciate on the spot the evidence afforded by their associations. During the progress of our winter courses this can be done effectually in the neighbourhood of London, or by means of the facilities of transport afforded by lines of railroad. I trust that, before the end of this session, a compact band of undaunted investigators, belted, strapped, and bag-bearing, armed with stout hammers and sharp chisels, under the veteran generalship of our Director-in-Chief, and officered by my mineral and geological colleagues and myself, will make the rocks shake and yield up their treasures for many a mile round the great metropolis."

But these bright anticipations were never, during Forbes's connexion with the establishment, adequately fulfilled. The disadvantages under which the School started continued to hinder its further progress, and as year succeeded year, matters showed no symptom of improvement. Forbes found himself compelled to undergo all the fatigue of lecturing, without the counterbalancing stimulus which a well-attended class never fails to impart. His lectures, that should have attracted a numerous body of students, were given to rows of almost empty benches, and the tones that were wont to delight many a brilliant audience, here returned to him well-nigh void. And yet the natural history lectureship was more popular than most of the others, so that his colleagues fared even worse than he did. In short, it

soon became sufficiently evident that the scheme of forming a great mining school in London had as yet failed to attain the success that had been anticipated.

Some attributed this result to the choice of London as the site of the school; others to the length and expensiveness, or to the too comprehensive character of the curriculum of study; while some looked upon the whole school as an instance of arrested development, and regarded its success as impossible until the arrangements which had been liberally conceived should be worthily carried out. But to whatever cause it might be due, there was no doubt of the fact. Our naturalist's anticipations, never very sanguine, had yet been grievously disappointed. He knew the possibilities of the Jermyn Street Museum, and used to say, that it might be made an almost unrivalled school of geology and the cognate sciences. So strongly, indeed, was he impressed with this conviction, that he sometimes found himself balancing in his own mind the advantages of the School of Mines with those of the Edinburgh professorship; and it was perhaps hard to say which at times kicked the beam, for the London appointment had not only its own prospective success to recommend it, but it was fortified by all the ties of the various friendships which a residence of nine years in the metropolis had now woven around him. If the School of Mines had become what Edward Forbes wished it should become, it is possible that he might never have left London, but have endeavoured to work out there the schemes he had been reserving for Edinburgh. But when he had at length fairly to confess that the London School had fallen far

short of his anticipations, and that there seemed to him but a feeble chance of its ultimate success, he abandoned all hope of finally settling in London, and returned with fresh eagerness to his first love,—the professorship in his *Alma Mater*.

The winter of 1851, however, witnessed only the inauguration of the School of Mines. Every allowance was made for the difficulties and hindrances almost inseparable from the early career of a new institution; and thus the lectures were given hopefully, in the prospect of larger classes and greater usefulness when the School should gradually come to be better known.

One of the most useful features of the School was the organization of a set of evening lectures for artisans, on the different branches of science taught by the professors. In the spring of this year a course of six lectures was given, that by Forbes (16th February) having for its title, "Why Fossils are Collected and Exhibited, Explained." The same course was repeated in April and May. Next year, however, instead of repeating the lectures, one or two of the professors gave a short course of instruction, each in his own department of science; and this plan was found to be attended with such excellent results, that it has continued ever since. On the day of issue, the tickets are so eagerly bought, that in less than half an hour the whole number is disposed of, and on the lecture evenings, the theatre is filled with as attentive and intelligent an audience as any to be found in London.

The close of the year saw the completion of the third volume of the *British Mollusca*. He also contri-

buted scientific papers to various journals, in particular to the Quarterly Journal of the Geological Society, the *Art Journal*, and the *Literary Gazette*. His delightful article on "Shell-fish, their Ways and Works," was published in the first number of the new series of the *Westminster Review* (January 1852). Many of his literary articles were reviews on books of travel, such as Neale's *Syria*, Christmas's *Mediterranean*, Squier's *Nicaragua*, Mundy's *Australia*. So that his pen, whether grave or gay, elaborating scientific description, or dashing off articles and squibs for the literary journals, was seldom wholly idle.

So again, in work and hope, another winter passed pleasantly away. Not, however, without its socialities, its soirées and dinners: the annual festivity of the "Royal Hammerers," when the Survey geologists came to London for the winter, with their songs written for the occasion; the monthly Red Lion meetings, with Forbes in the chair, and the table girt round with applauding brethren; the anniversary of the Geological Society, and of societies and clubs, scientific, philosophical, or otherwise, without end.

When Easter came, he took a short holiday in Belgium, "with the hope," he said, "of getting London fog out of his head." With his friends of the Geological Society—Prestwich, Sharpe, Austen, and Morris—he rambled over the country under the guidance of Dumont, who pointed out on the ground the leading features of his great map of Belgium. After seeing these, and noting not a little that bore importantly upon questions that were engaging the attention of the

Geological Survey at this time, he re-crossed the Channel, and found that during the fortnight of his absence, "a mountain of letters" had accumulated in his little three-cornered den in Jermyn Street.

The return to London was, of course, a return to hard work, for which, however, his short Continental ramble, terminating on the 18th of April, had somewhat braced him. And yet, on the 8th of May following, he wrote to Mr. Jukes—"I am nearly fagged out with lecturing, etc., but, thank Providence, the Museum lectures have just come to an end for the present."

The lectures at King's College, however, now re-commenced, lasting nearly all the rest of the summer.

On the 29th of August, his daughter was born, and very soon thereafter he left London for Ireland, partly for the British Association meeting, which was to assemble this year in Belfast, and partly to inspect some palæontological localities with Sir Henry de la Beche and Mr. Jukes. The papers he read at this meeting were—

1. On the Fossils of the Yellow Sandstone of the south of Ireland.

2. On a Species of Sepiola new to Britain.

3. On a New Map of the Distribution of Marine Life, and on the Homoiozoic Belts.

Referring to this meeting, Mr. Jukes writes: "The Red Lion dinner that year was one rather above the average for fun and jollity, the Prince of Canino being especially remarkable for his roar on the occasion, until at last the hotel establishment fairly broke down under an apparently unexpected demand for coffee.

"After the meeting, Forbes and Sir Henry, with my

wife, her friend, and myself, started for Dingle, going by way of Dublin, Limerick, and Tralee. We stayed two or three days in Dingle, Forbes and I driving out each day to the neighbourhood of the coast about Ferriter's Cove and Dunquin, and Sir Henry, whose legs had then begun to fail him, sailing round in a small cutter which happened luckily to be there at the time. Forbes and I made large collections of the Upper Silurian fossils, that occur so abundantly along the extreme western shore, and I got my first view of a section which has given me, and others of the Survey, many an hour of hard work and puzzling thought since then. We could neither of us help uttering an exclamation of wonder, as we walked from near Ferriter's Cove, up the gently sloping hill at the back of Clogher Head, and saw first one peak, and then another, of the Blasket Islands rising over the crest of the hill before us. We had not previously caught a glimpse of the islands, and as we had the sea just below us on the right, and knew that the coast there ran on the whole nearly north and south, we could not imagine for the moment where this lofty land could be, till a few steps more disclosed the whole group rising steeply up from the sea into sharp peaks and ridges, with the white foam creaming and mantling round their base.[1]

"The last evening we were on this shore, we had seen Sir Henry's little boat pass through the Sound into Dingle Bay, and the wind fell to a calm as we were struggling over the ridge at the back of Dunquin, under

[1] Sketches of some of this scenery will be found in the Explanations to accompany Sheets 160 and 161, 171 and 172 of the Maps of the Geological Survey of Ireland.

the weight of our fossil-bags. It was eight o'clock when we got back to Dingle to dinner, and there we found no tidings of Sir Henry. We were getting anxious, when at last he himself turned up about ten o'clock. He had been becalmed in the Bay, and only got in at last in a canoe that they luckily fell in with. In traversing one of the small villages perched on the slopes of the hills that fall towards the Atlantic, south of Dunquin, Forbes said that it put him in mind of some of the villages in the Greek islands. Each cabin was perched on a little patch of ground surrounded by a small fence of stones and separated from the rest by a deep little gully or stream, the path through the village forming a perfect maze of corners and ups and downs.

"Having seen what we could in the time at our disposal, Forbes and Sir Henry went across to Valentia in the boat, while the ladies and I prepared to car it to Killarney and Glengariff, where we were to meet again. Sir Henry, as usual, was bustling about as well as his growing infirmities would let him, making arrangements for us as well as himself, inquiring the distance, and so on, and often repeating, 'The road has a good bottom, a good bottom.' 'Well then,' said Forbes, at last, looking over slyly to me, 'there's the less occasion for any *bustle* about it.'"

Before the end of September he had returned to London. As most of the year, owing to the Jermyn Street lectures, and the press of Museum work, had been spent in town, there had accumulated a good deal of palæontological arrears in the field which it was desirable, if possible, to clear off this year. His colleague, Mr.

Bristow, had been at work on the lower cretaceous rocks of the Sussex coast, and the sections there now needed to be visited by the palæontologist. Forbes was likewise anxious to follow up his previous investigations among the tertiary deposits of Hampshire, so that there was plenty of field work to keep him a month or two out of London.

On the 30th September, he writes from the Museum to Mr. Jukes :—

"After three days' bustle and bother, we got our traps in Harewood Square packed, and sent a small army of forty packages to Tilbury's warehouse. Yesterday at three, I carried off my wife and family and transported them to Winchester, where I left them under safe and kind charge this morning. I have work to wind up at the Museum, so must be in town for three or four days, and then start *solus* to Hastings to look at the sections there for Bristow. Thence I shall go to Bognor and Bracklesham, and, after stopping a day or two at Winchester, at the end of next week to superintend my daughter's christening, will join Sir Henry in the Isle of Wight."

The Isle of Wight remained his head-quarters for the rest of the year. At Freshwater, on the western shores of that island, he spent some time with Sir Henry, and gives an amusing account of his doings in a letter to Mr. Reeks, the secretary at the Museum :—"The Governor and I are daily at work here, flanked by Gibbs, Cotton, and two small boys. The Governor rides on his pony, a very quiet beast, which, however, is believed by his master to have an irresistible propensity to leap over logs of wood when he sees them. It is true that he has

never done so yet, but then he always stops to look at them, Sir Henry says with the above-mentioned intent. If I stop to gather a blackberry, the pony stops, and won't go on till I have done. The Governor comes out with his pockets full of excellent prawns and sandwiches, which he distributes all round about two o'clock P. M. daily. It was just as well I came down, since he had made Gibbs leave this place long before it had been properly collected or examined. We have been most successful, and I hope to turn out a very fine and interesting section, better than any done previously of this spot, and that is saying a deal after the excellent work of Prestwich and Dr. Wright."

Again, on reaching Brixton, he wrote to the same correspondent,—"Bristow and I migrated in a phaeton from Freshwater on Saturday, passing Gibbs emigrating with goods, chattels, a wife and five children, in a donkey-cart. Gibbs did the voyage in three hours. We left the Governor hearty—I think really better in health —and busy about his tumulus, in which he has been digging for a week, and finding—nothing.

"It is raining and blowing most abominably. Nevertheless, in spite of the weather, we made some discoveries yesterday, that escaped everybody who has been here before."

"BRIXTON, ISLE OF WIGHT, *27th October.*

"MY DEAR RAMSAY,—I am sitting beside —— and five cats. The pussies were confided to his care by his sister when she left, and he feeds them all on a clean napkin twice a day, with the most charming gravity. The cats will certainly commit suicide and go to the

diggins when he departs. The weather is horrid, so the cats are really amusing.

"We have been very busy at the tertiary sections, and cuttings of the Wealden, and, I hope, will be able to show that there is a thing or two undiscovered. I expect next month's work at Whitecliffe will develop sundry germinating ideas. On these points I must write to you more at length. Gibbs is working famously, but is not as well as I could wish. I am very anxious that our tertiary collections should be fine, since there are such very fine private ones in London.

"I fetch my wife and bairns to Sandown on Monday —leave them there and go to town to see to matters at the Museum for four or five days, and to hear Playfair's lecture, then return here. I will be at the first meeting of the Geological; Sedgwick is to hold forth on a new classification of the Caradocs."

Mrs. Forbes and the children remained with him at Sandown till the beginning of February 1853. It was during this winter that he worked out those novel and deeply interesting points in the classification of the tertiary formations, which threw a new light upon that part of British Geology. The detailed memoir on this subject, however, he did not live to complete; it was finished by Mr. Austen and Mr. Bristow after his death.

The weather during the greater part of his stay in the island was cold and very wet, and he used to work on in mud and rain. This exposure contributed not a little to impair his health, while one of his assistants contracted a rheumatic ailment that confined him for many weeks. The interest and novelty of the discoveries,

however, usually kept them out of doors in spite of the inclemency of the weather.

On November 12th, he writes to Mr. Ramsay :—

"It is a very wet day; raining and blowing; and we cannot go out. No loss of time, for I can get more fossil work done in a day here than in three in London. Before setting to the specimens before me, however, I will write a short screed anent our doings among the tertiaries.

"Bristow has told you of the curious fresh-water post-tertiary deposit which we found on the cliffs at Collwell. It is pretty clearly of the same age with the newer elephant-gravel of these parts, and the same thing with the stuff in the Dorsetshire coombs, on which I have many notes. The top of Headon Hill is capped by a great esker of gravel of very different age, and much older.

"Our grand 'find,' however, concerns the Eocenes, or rather the fluvio-marine portion of them. You are aware that they have hitherto been divided into

"A. *Upper Fresh-water and Estuary.*
"B. *Upper Marine.*
"C. *Lower Fresh-water, etc.*

C. resting on the Headon Hill white sand, which is regarded as part of the Barton series.

"Now it has been shown by more observers than one that A belongs to the same series as C, and B is only the result of temporary interrupting conditions. Moreover, Prestwich, Lyell, and others have shown that A, B, and C are all essentially parts of the Eocene series below, and not, what the French have maintained, a distinct series,

according to some, forming a stage of the Eocene; according to others, constituting the Lower Miocene.

"Worked (and most accurately worked), as these beds had been by Prestwich, and, in part (very accurately also), by Wright, not to speak of the number of pages written by great stars and small about them, I certainly did not expect that we should do more than add some minutiæ of interesting details; that a new classification of them could come out, I certainly never anticipated. Nevertheless, I believe we have got hold of a great step in British, if not in European Eocene Geology.

"It is quite true that the fresh-water and estuary beds above the 'upper marine,' are repetitions of those below, palæontologically and geologically. But this is true only in part. The old 'upper fresh-water' is really divisible into *two* series of strata, the uppermost of which is more distinct from the lower, than the latter is from the beds *below* the 'upper marine.' *This has been entirely overlooked.*"

Again, on the 19th of the same month, "The weather here is positively hideous, nevertheless, knee deep in mud, we keep advancing, and *very satisfactorily.* There is some pleasure in working out a point that has bothered Prestwich, D'Archiac, and Dumont, and muddled every body else. Dumont was nearest the mark, probably, after all. But everybody has been led astray by the very natural fancy that what they saw at Whitecliff was what they saw at Headon. Since I wrote last we have found a remarkable, and, in some respects, better section for true upper beds than Whitecliff; one at St. Helen's that seems to have never been described. We are waiting

for favourable skies and tides. The post-tertiaries here are also exceedingly interesting."

He writes to Mr. Reeks on 27th November :—

"I am sorry to hear of the state of the School; not that it is really so bad, but that, in order to make out our case for a continuance, we ought to be able to show a positive increase. I look upon the Turks as accidents (I hope not unprofitable ones), and matriculated amateurs, as very good in their way, but not the class of men for whom the School can claim public support. There must be a strong push made for next session. When you can spare a few minutes, you would oblige me much by a line respecting the nature of the propositions for going a-head debated at the Council. What are Playfair's notions now?

"You should catch old Z—— some fine day in the Museum, lock him up, and make a hostage of him for the Turkish debt.

"The weather has become suddenly fine to-day. We hope it will keep so. The deluge is over. My son and heir's second birthday was yesterday: Bristow, Miss B., and Aveline, dined with us to celebrate it. Bristow brought him a magnificent microscopic donkey, and I presented him with a Noah's ark. He opened it and let out Noah, which is the reason why the rain stopped. You are aware that Noah did not come out of the ark until after the deluge was over.

"My work here is far too important to quit."

The Council of the Geological Society had determined to propose Forbes at the next general meeting for the office of President of the Society—a very great honour

to be conferred on so young a man. It is to this he refers in the subjoined letter :—

"SANDOWN, ISLE OF WIGHT, 19*th December* 1852.

"DEAR RAMSAY,—I should have written before since you came to town, but know how busy you must have been. Thanks for congratulations about the Presidency, but barrin' the honour, the office is a deal more troublesome than pleasant, and, say what folks will, costs the holder, or at least ought to do so. I have done my best to shirk it, though I feel the compliment very much, especially coming as it did from the old hands in the first instance. My knowledge of the ins and outs of the Geological Society, acquired when I was assistant Secretary, will enable me to get through the business part more easily than I otherwise could. For the last three years, too, I have been hard at work, during extra hours, at the 'Mollusca' book—now at an end, or at least with the index in the press, besides sundry doings for the periodical press, necessary for pulling up deficiencies in the exchequer. I shall start the new year clear of debt, and with a few pounds in hand, and intend to do no more extra work than may be a recreation, so that after all I shall have more time in hand for duties of all kinds than hitherto.

"I have heaps of survey materials to work up, and a difficult set of lectures for the first part of my course; but with my evenings free at home, I can master them all if in good health, and this air has, I hope, given me a stock for the session.

"I propose to go to Ireland in the middle of next month, and to remain here writing up, etc., until I go.

I wish to be settled in London before my lectures begin on the 8th of February. I want Gibbs to work for ten days at the other side of the island, on a very important job, which he alone can be trusted to do.

"I shall leave wife and babbies here when in Ireland, and fetch them after they have all fattened considerably. I must look out for a house as I go through town."

He thus sums up the results of those busy weeks :—

"SANDOWN, 12*th January* 1853.

"DEAR RAMSAY,—I arrived here last night after being with Gibbs for a week, finishing up the other end of the island. The results are most satisfactory.

"At length I have succeeded in examining bed after bed, the whole series of fluvio-marines; I might almost say without the break of an inch.

"There are minute points, it is true,—all, however, purely palæontological, that would require a long spell of dry weather before they could be got at. But the geological and zoo-geological evidence is perfect; the order of superposition and perfect conformity of every bed are now made out without possibility of question. There will be more light thrown upon the Upper Eocenes (or Lower Miocenes, as the French will call them) by these sections than by any in Europe, and they will form a scale and test for the continental ones. They will also, if I do not greatly mistake, settle the question about their nomenclature, and *definitely place* the upper fluvio-marines, and the corresponding strata of France and Belgium, in the *Eocene* series. Gibbs has worked like a brick, and he can tell you that our work has been no joke, with such weather as it has been done in.

"With all the beds fresh in my mind, and so familiar that I could tell each by the mere colour, or rather shade of colour of mud in a ditch, I thought it would be useful to go over the Freshwater peninsula, and trace in the boundaries of the denudation of these Upper Eocenes, and the superficial area occupied by the Headon fluvio-marines. This may save Bristow some trouble. I have also traced, as far as I believe it is possible, the boundaries of the area occupied by the Hempstead beds. Tell Bristow of this.

"I shall be in town next week on my way to Jukes. Mrs. F. and family will remain here whilst I am away. I shall so arrange my Irish journey as to have three or four days after my return here before my lectures commence, in order that I may avail myself of the opportunity of looking to certain points in the Whitecliff sections, about which I require to see Edwards' collection in London first.

"I am writing up my account of these tertiaries most vigorously.[1]

"Wife sends best regards. She and my little ones are plump and thriving. Hoping to see you soon, and to have the pleasure of being introduced to Mrs. Ramsay, ever, dear R., very sincerely yours, EDWARD FORBES."

Here, perhaps, better than elsewhere, just as he has completed his investigations in the Isle of Wight, and is on the eve of starting again for London, there to resume his post at the Museum and School of Mines, may be

[1] It has been already stated that he did not live to complete his account of these Isle of Wight strata, but that it was finished after his death by Mr. Austen and Mr. Bristow, and published in the *Memoirs of the Geological Survey*.

inserted an interesting letter written by him while still at Sandown, to the late Dr. Drew of Southampton, on the subject of museums and the teaching of the natural sciences.[1] Some eight years previously, a gentleman of the name of Hartly had left the bulk of a large fortune to the town of Southampton, for the promotion of the study of Natural History, Anatomy, Antiquities, and classical and Oriental literature. Forbes was applied to for his advice, and the following was his reply to Dr. Drew :—

"SANDOWN, 27*th December* 1852.

"MY DEAR SIR,—You ask me in what way the study of Natural History might be most effectually promoted by an institution such as that intended to be founded at Southampton.

"The question is one to which a satisfactory answer cannot readily be given. It is one over which I have often pondered with much anxiety, believing that the study of Natural History will sooner or later become general in this country, and be accepted as a necessary branch of general education. Some *accurate and systematic* knowledge of the natural productions of our planet, and of its geological structure and history, should surely be possessed by every well-educated person, and ought to be taught to youths of all classes. Moreover, there can scarcely be a better, certainly not a more engaging exercise for the logical faculties than the practice of Natural History observation, and the distinguishing and defining of affinities and analogies.

"At present the systematic teaching of any portion

[1] This letter partly anticipated his lecture "On the Educational uses of Museums," with which he opened the succeeding session (1853-4) of the School of Mines, but is sufficiently distinct to merit a place in this Memoir.

of Natural History in this country is *almost* entirely confined to the medical, the engineering, and mining schools. It is made a branch of professional and not of general study. The popular lectures given at mechanic's institutions are almost always of too isolated a character, or consist of too few in sequence, to do more than excite curiosity or interest for the moment, however able the lecturer may be.

"It appears to me that there are three modes by which, taken in combination, a knowledge of Natural History may be to a considerable extent diffused by a well-conducted scientific institution.

"1*st*, By courses of lectures—no course consisting of fewer than twelve lectures, nor including more themes than can be fairly illustrated within its limits. Longer courses, say of twenty or thirty lectures, would be more beneficial. They could be given most effectively during the spring and summer months, and should be varied by occasional field excursions. I need scarcely insist that to make such lectures truly useful, the very ablest men should, if possible, be employed to give them. The mere 'popular lecturer' is too often a man who gets up a subject with which he has little or no practical acquaintance. However pleasing his discourse may sound to the ear, it makes but little impression on the mind of his hearers. The more eminent the lecturer (as an original investigator), provided always that he has the gift of telling his story clearly and fluently, the more permanently interested will his audience be.

"2*d*, *By instruction delivered to limited classes; say of twelve or fewer persons at a time, in the form of*

demonstrations. The principles of Natural History, the methods of study and manipulation in the several departments of the science, may be thus effectively *taught*, provided the teachers be able and *practical* naturalists. I foresee much difficulty for some years to come in the procuring of competent instructors. Even among reputed naturalists there are few persons sufficiently well-grounded to undertake the office. Only by well-remunerated, permanent posts, could the right men be secured. The duties, however, might be combined with those concerning the charge of the Museum.

"3*d*, By what I may call *eye-instruction*, conveyed by aid of a well-regulated museum, a department of the institution absolutely necessary for the successful prosecution of teaching either by lecture or demonstration. Much, however, may be done in the way of imparting knowledge by museum arrangements alone, but very rarely do we find this systematically attempted. Provincial museums are too often ambitious attempts at general collections, and, necessarily, failures. Too many of them are little better than curiosity-shops. In their best aspect they are, with very few exceptions, far more costly and far less useful than they ought to be. I would have a provincial natural history museum to consist of three departments, for which three spacious rooms, if properly constructed, would suffice.

"1. A *local collection*, illustrative of the zoology, botany, and geology of the county or district. This, if done with judgment, would attract visitors from far and near, and be equally interesting to residenters and

strangers. Southampton is peculiarly well situated for the forming of a valuable local collection.

"2. A *teaching collection*, consisting of carefully selected, well-arranged, and thoroughly labelled types of the classes, orders, families, and leading genera of animals and plants, of the series of geological formations and their characteristic fossils, and of minerals—no superfluous specimens to be admitted.

"3. A *miscellaneous collection*, including fine or rare specimens of exotic productions not necessary for the teaching collection, remarkable curiosities, and ethnological illustrations. There might be included, to render this division useful as well as curious, a classified trade-collection, displaying the natural productions or sources of production used in commerce. I may illustrate what I mean by referring to the admirable cases illustrative of imports into the port of Liverpool exhibited last year in the Crystal Palace.

"In offering these suggestions respecting a museum, I have confined my remarks to Natural History, but I hope that the department of Antiquities will also receive full attention, and that the local antiquities be kept distinct from the miscellaneous specimens.

"I hope most earnestly that the Corporation of Southampton will found an institution adapted to serve as an example and model for other places. This is a grand opportunity.—Believe me, my dear Sir, very truly yours, EDWARD FORBES."

During the sojourn among the tertiaries of the Isle of Wight, Forbes had found time for very little literary

of scientific work, save the geology of the island, and the preparation of the last number of the fourth and concluding volume of the *History of British Mollusca.* That great work was now completed—a monument to his scientific knowledge and his industry, as well as those of his coadjutor, Mr. Hanley. He now resolved to return to the volume of the *Natural History of the European Seas,* part of which had been printed, though two-thirds had still to be written. Yet in the end he never found time to continue its preparation, and, as already stated, it was completed after his death by Mr. Austen.

On the 8th of February his lectures at the School of Mines began. On the 18th of the same month was the anniversary dinner of the Geological Society, when he was to take the chair as president. Anxious, as all presidents are, to see a good attendance, he himself wrote invitations to men of note in London, and was warmly aided by some of his friends. His wishes may be best gathered from the following note to Sir Roderick Murchison :—

"*Wednesday morning.*—I am sorry to hear from Captain Smyth that he is knocked up by influenza, and cannot be at Friday's dinner. I am very much obliged to you for so kindly stirring in this matter, and hope especially that you will persuade the Duke of Argyle to come. The more great names the better, but I am not much in the way of seeing them. The American ambassador, to whom, among others, I flew a note on chance, has accepted the invitation, and as he is a new orator, may be pulled up with effect. I wrote to both

the Belgian and French ministers, on account of the Wollaston honour, and stated the facts in my notes, but have had no replies. Bunsen sends a very kind note of apology on account of engagements. I want a bishop or arch-parson to say grace, and thought to have got Jelf, but he is engaged.

"I shall be extremely obliged to you if you will take charge of a toast, either my own health, as president, or the Geological Survey and School of Mines. The latter I would much rather not give myself, on account of my personal connexion with it; and I think it might be given with great effect either by you or the (late) president. I am anxious that it should be well done, and that De la Beche should be called up to reply to it. The completion of the survey of Wales would make a point in it, and the rearing up of young geologists, now hatching in Jermyn Street. Perhaps you would arrange with Hopkins, he to take one toast and you the other. *Your* doing so would be a great favour to me and attraction at the meeting."

His Friday evening lecture at the Royal Institution this spring was fixed for the 13th of May, his subject being "Some New Points in British Geology." In this lecture he pointed out the general nature of his recent researches among the tertiary strata of the Isle of Wight, showing that the geology of that island had been previously misinterpreted; that there existed a group of strata there which had not hitherto been recognised in Britain; and that the Isle of Wight sections, instead of being incomplete, were really the most perfect in Europe, perhaps in the world, and tended to throw fresh light on

the conformation of vast regions of Europe, and, possibly, even of Australia.

This spring, Forbes undertook a course of six evening lectures to working men, "On the Elements of Natural History." They were given in the theatre of the Jermyn Street Museum, every Monday evening, to numerous and attentive audiences. The change was a pleasant one, from the nearly empty hall in which his morning prelections were delivered, to the same hall in the evening, with its sloping tiers of benches filled almost from floor to ceiling. Besides these lectures, he gave another course of five, "On Animal Forms," at Marlborough House, under the auspices of the "Department of Practical Art."

The Geological Survey of the United Kingdom, along with the Metropolitan School of Mines, having been transferred from the Office of Woods to the department of the Board of Trade, a Treasury Commission was appointed to inquire into the working of the School, and to report upon the best means of improving its organization and extending its usefulness. Forbes, along with the rest of his colleagues, gave evidence before the Commissioners, and pointed out what he considered the injustice done to men of science in the treatment they received from the Government, as well as the need of clear and definite arrangements for the proper conduct of the School. The report given in to the Board of Trade by the Commission incensed him not a little; "Not," he said, "because there was any attempt made to injure us, but because it was so plainly slighting to us in its propositions." In short, in his estimation, the Report if adopted would only make

matters worse by continuing and confirming the custom of remunerating clerks and secretaries at a rate greatly higher than that at which the services of men of science were estimated. Fortunately the Report was not acted upon. But the uncertainty and want of precision in the arrangements of the School of Mines continued, and formed the subject of much careful consideration to the Board of Trade. The president, Mr. Cardwell, fully appreciated the grievances stated by Forbes and his colleagues, and during the summer had frequent consultations, especially with Forbes, whose judgment had great weight with him. The threatening aspect of the political horizon, however, just as the Russian War was on the eve of breaking out, necessarily impeded all arrangements that involved considerable pecuniary grants. Forbes classified his complaints under two heads; those relating to the School, and those which concerned the officers at the heads of departments in the Survey, etc., having daily duties. Of the first class, he dwelt especially on the fact, that the Professors had not a sufficient outfit for lectures, etc.; that they had to pay their own attendants out of their already sufficiently small incomes, and that they had to take their students to the country, live in expensive hotels, and received no subsistence money to defray their additional expenditure. In the second order of complaints he placed the inadequacy of the pay of the heads of departments in the Survey; that these gentlemen were ranked by their salaries in a lower grade than many officers in the same department, such as Registrars and Secretaries, who had no right on any grounds to a superiority of position, and whose duties

required no special capacity or peculiar training, beyond that of many thousands of clerks in public and private establishments; that no personal allowance was granted to meet the expenses entailed by the frequent changes of station in the Survey; that while the principle of rise of pay with length of service was admitted in the Art and general departments, it was ignored in regard to the Survey, and generally, that both the Survey and the School demanded much more fostering care at the hands of Government than had ever been extended to them.[1] "Now is the time to fight the battle," he wrote to Mr. Ramsay, "and fight it I will, on principle, and for the interest of all scientific officers."

So with this warfare to harass him, two courses of lectures at the School of Mines, and his botanical lectures for King's College, to occupy his time, besides all the ordinary work of the Museum and the Survey, the summer of 1853 passed away. The end of July found him beginning to get jaded with over-work, but still unable to take his annual holiday. It had been arranged that he should take the students of the School of Mines into the country for some weeks to train them in field observations, and the beginning of August had been fixed for the purpose. Leaving Mrs. Forbes and the children at Hythe in Kent, he started for Swanage, Dorset, and spent a fortnight with the students. His mode of teaching is referred to in a note to Mr. Ramsay :—

[1] These complaints are here condensed from his own enumeration of them in letters to Professor A. C. Ramsay, chiefly in a note dated "Museum, 18th November 1853." It is but right to state that the Survey and the School have since that date been transferred to the control of the Privy Council on Education, and that an augmented rate of pay with progressive increase, as well as personal allowances, have been granted to the Surveyors.

"SWANAGE, 13*th August* 1853.

"I have them (the students) hard at work here, exercising them in the construction (each separately of course) of a detailed section of the Purbecks, palæontological and mineral characteristics of every bed to be fully stated. I shall then make use of them to draw up with me a similar section of the Hastings Sand, and on Thursday next leave this for Yarmouth in the Isle of Wight, where they shall go through the Eocenes. Whilst with me they will have seen in very characteristic localities all the formations, from the Kimmeridge to the Upper Eocene included.

"I shall leave them in the Isle of Wight to finish their work alone. It will be very convenient for them, as they will take ship at Southampton for Falmouth, there to join Smyth. After that I *must* have some rest. I cannot stand this perpetual head-work, and must have change of scene. I find just money enough in the exchequer to give me and my wife three weeks on the Continent, and I mean to go. When you got your passport, did you include Mrs. Ramsay in it? Any hints will oblige. Of course I shall be back to give the lecture on the 1st of October at the Museum. The subject I mean to take up is the Educational value of the Museum, and I intend to point out what is very apt to be forgotten, that the peculiar merit and character of our place is the application of it *as a museum* to purposes of instruction in directions that *mainly* are not looked to elsewhere. I shall speak very plainly on the subject.

"I have had many conversations with the men here about their future prospects and intentions. —— has

especially opened out (apparently as a spokesman for all the rest) about the surveying service. The absence of all allowances for hotel expenses, and the indefinite character of future prospects, are the points that make the service look very small in their eyes. There really must be something very definite done in this matter. The whole service ought to be put on a proper footing. It must be done, too, before the estimates are arranged for next year, for Survey arrangements are not permanently settled at the Board of Trade yet. The surplus money in the Survey ought to be used for purposes of pay. Our service ought to be placed on as good a footing as the Engineers'. I mean to take the first opportunity of making a strong statement on the matter."

Too much exhausted by incessant work, he abandoned the British Association, which met this year at Hull. Instead of attending the meeting, he spent the month of September in France; the first week resting and geologizing round Paris, the second and third in Auvergne, among the volcanoes and tertiary strata, and the fourth, working the Paris basin, in all its typical parts, with Mr. Prestwich, who went over to join him. Referring to this trip, he writes to Mr. Ramsay :—

"I would urge in the strongest way upon you, when you can get a spare month, to make a run to Auvergne. You might go to Clermont, and see all the leading phenomena in ten days, or even less. Before working the Scotch traps, such a visit would be invaluable. I was utterly astounded at many things, and never expected to find such perfect duplicates of ancient igneous rocks among many of these comparatively modern ones.

The country is not half worked, and the true history of its tertiary geology has all to be made out. I see glimmers of the way how, but it would require leisure and time.

"Mrs. Forbes was with me, and we enjoyed ourselves very much, at comparatively small cost,—much less than living in London. She is now with the babbies at Hythe."

These few weeks in France were weeks of thorough enjoyment. He used to speak of them as his "honeymoon trip," and as the very happiest time of his whole life. He made work subservient to enjoyment, and the holiday was in this way the first, not on duty, that Mrs. Forbes and he had spent together. The weather, however, proved very bad,—storms of hail, rain, and wind. The tourists were frequently drenched with rain, especially during an ascent of the Puy de Dôme, when they were exposed for hours to the pelting of the storm. Forbes himself was thoroughly chilled, and used frequently after this to complain of pain in the head and back.

Recruited by change of air and scene, he returned to London in time for the opening of the School of Mines on the 1st of October. He had been appointed to give the introductory lecture, and the subject he chose, as noted in a previous page, was the "Educational Uses of Museums," having, of course, especial reference to the collection with which he was himself connected.

Although in that lecture he took occasion to mention the increase in the number of students, there was still very little in the prospects of the School on which to found much congratulation. The arrangements with

the Board of Trade, too, still remained in the same unsettled and unsatisfactory state. It was with no small eagerness, therefore, that Forbes now heard of the rumoured resignation of Professor Jameson. There was no doubt about the matter this time. The veteran geologist, feeling the accumulating weight of years, had sent in to Lord Aberdeen, then Prime Minister, a conditional resignation, the chief points in which were, that a pension should be assigned to him, and that the keepership of the Museum should be separated from the professorship, and given to his nephew, Mr. Laurence Jameson. Except on the question of the separation of the keepership, he was supported by his colleagues in the University, who were likewise anxious that Edward Forbes should put in his claim.

Now at last came the opportunity for which he had longed; the goal to which, during these many years of toil, he had never ceased to look. When it arrived, he was fighting against over-work and many discouragements, and yet we cannot wonder that the final decision was taken at last with hesitation and regret. The associations by which a ten years' residence had linked him to London, were not to be lightly cast away. His circle of acquaintance had every year widened. He had risen to a high rank in the scientific world, and exerted perhaps a more potent influence among all classes of society than any other scientific man of his day. His position in London, therefore, was in this respect such as no provincial town could hope to parallel. But, besides this, he had still closer ties. In London, which had witnessed his struggle for life and fame, lived most of his

closest friends. They had been, many of them, his fellow-comrades in the battle, knew him thoroughly, and were as thoroughly known to him. Voluntarily to exile himself seemed almost like an unkindness, and a slight upon the years of his intimacy with them. With Forbes these feelings had a peculiar force. His judgment, and all the dreams and aims of his life, pronounced for the professorship in the north; his love of friends and of society prompted him to remain. There was little doubt, indeed, that the former would carry the day, but, before taking any active steps, he summoned a council of friends immediately after the conclusion of his introductory lecture at the opening of the School of Mines. Sir Charles Lyell, Sir Roderick Murchison, and Mr. Pentland happened to be at hand, and being all his staunch friends, he opened the subject fully to them.

They each supported his views, and though anxious, if possible, to retain him in London, vigorously aided him in the resolution to which a calm consideration of all the circumstances had led him. What that resolution was, he communicated to Mr. Ramsay as follows:—

"The time is at length come when I am obliged to decide between trying for Edinburgh and sticking to London. I can assure you that it is with a somewhat sorrowful spirit I am obliged to resolve for the north. . . . After carefully considering the state of things here —most unsatisfactory, I am sorry to say, they are—I determined to risk the hazard of a try. I took the advice of Murchison, Lyell, and afterwards of Sir Henry himself, who really went over the matter clearly and fairly, but piteously despondent. To-day I went to

the Home Office with Pentland, to inquire into the real state of the case, and found there was no time to be lost, as for a post so good there are plenty of busy candidates and intrigues. I do not feel by any means confident about obtaining it, and am in that frame of mind that, whichever way the matter goes, I will feel more comfortable than under the present unsettled state of affairs."

Again, to Sir Roderick Murchison he writes :—

"After very earnest consideration of the matter, I feel satisfied that I may be of more use to science in Jameson's post than in any other. Were I independent of all office, I could be of more use in London, and would not think of leaving; but since I cannot quite dispense with an appointment, I shall be better able to do original work, and to train men for it, with the independence and status that an Edinburgh professorship gives, than as holder of a small post in London."

Professor Jameson, from the infirmities of age, was little more than a passive agent in the matter. He had resigned only conditionally, and one of his stipulations, that of separating the Museum from the Professorship, was opposed by his colleagues, and declined by the Government. Strenuous efforts, however, were made to obtain it for him; and on no part of the proceedings connected with the Chair was Forbes so keenly sensitive as on this. To Mr. Horner, who had taken up his case warmly, he thus writes :—"This point is likely to cause a difficulty, since I believe the Lord Provost (of Edinburgh), and possibly other people (but certainly none of the Senatus), are advocates for the separation, on the

ground that greater facilities would thereby be afforded to the public. There is a fallacy in this notion; for the impediment to study offered by Jameson, depended on the professor's peculiar character, and might easily be prevented by a regulation of the powers of the Keeper. But to separate the Keepership from the Professorship would be to paralyse the Chair. The Keeper would have it in his power to prevent the Professor illustrating his lectures properly, and in the lectures, one system of nomenclature might be taught, whilst another entirely contradictory might regulate the objects in the Museum! How could any true teaching go on under such circumstances? I certainly could not conduct the Chair as it ought to be conducted under these circumstances. I can confidently appeal to the men of science who have visited the collection under my charge, and ask where they could find greater facilities for study offered; and, if I went to Edinburgh, the same principle would govern my actions. I will keep you well-informed of the progress of affairs."

Although he believed himself to have formidable competitors in the late Dr. Fleming, and in another gentleman still living, his success was certain from the first. Indeed, the amount of influence which he and his friends brought to bear on the Home Office was enormous. Men of high social position, as well as the most eminent men of science, actively supported his application. This support came not from London only. The Professors of the Edinburgh University were almost unanimous in their eagerness to have him as a colleague, and the Town Council seemed equally favourable to his

election. From all quarters, political and scientific, came testimony to the pre-eminent fitness of Edward Forbes to be the successor of Jameson. "I have nothing to complain of as to my friends in this matter," he said. "Murchison has proved a trump, as he always does, so has Horner, and Lyell has been endeavouring to turn it to account, by calling Mr. Cardwell's attention to the necessity of providing better for scientific offices generally. The Duke of Argyle has taken the matter up most warmly and actively. . . . I return the Provost's and C. Maclaren's kind notes. I shall not forget their straightforward and unsolicited friendliness; I value it very much indeed." Every movement, whether in London or Edinburgh, was made known to him through many different channels. In short, although his warm fancy magnified the obstacles in his way, and regarded his ultimate chances as very dubious, there could really be no doubt as to the ultimate success of a candidate whom everybody seemed determined to support.

While matters were in such a state, that he felt it would be rash to leave London for twelve hours, he received, on the 13th of October, an urgent letter from the Isle of Man, requesting his presence there, owing to the sudden and serious illness of a near relative. There were circumstances in the case that concerned his own Manx affairs, and it was impossible to avoid undertaking the journey. Before leaving, he endeavoured to put his chances of success in Edinburgh on the best footing, and left instructions with his friends to work on his behalf. Thus to Dr. Lyon Playfair, "Whilst I am away much may be doing in Edinburgh beyond my reach, and I trust in you, as an old friend, to put a spoke in

the wheels of my opponents if you find them going too fast, and to aid me as much as possible." By the 19th, however, he was again in London, having been absent only five days.

On getting back, he found that a new form of opposition had sprung up in Edinburgh. A proposition had been started to have Jameson's lectures read for him, while the veteran himself continued to hold the professorship. This met with favour in the Edinburgh Town-Council, and was eventually acquiesced in by the Senatus of the University. But when Forbes heard of it he regarded the movement as a very formidable one to his prospects. "As I expect" (he wrote to Mr. Horner), "the whole affair will now come to a deadlock, and be delayed until spring at soonest; I must just hold myself free to act accordingly. I certainly should have liked to have had the post as it stands, since I think it might have been turned to good service for science, but if they will mutilate these posts in Edinburgh, I must just make the best of London." "You have little notion," he said to Mr. Ramsay, "of the botheration and struggle attending a contest of this kind. Scarcely a day passes without my having to stump an intrigue."

It was reported in London that these movements had disheartened him, and that, in fact, from the very first, he had been only half in earnest in his candidateship. The regret at leaving London which he always expressed to his friends there, both orally and in his letters, led many to believe that he would prefer to remain in the metropolis. But that he was in earnest in the wish to stay, and thus to forego all the dreams of his life, cannot

for a moment be believed. Mr. Horner, indeed, to whose ears the report of Forbes's fickleness had come, and who, like all his London friends, would much rather have him still with them, wrote to ask whether the rumour were true, and our naturalist thus indignantly denies it:—

"JERMYN STREET, *October* 26, 1853.

"MY DEAR MR. HORNER,—I should have been deceiving you and many other kind friends if I had desired to retain my London place in preference to the Edinburgh Chair. Rest assured that there *is no post here*, or *possible to be made here*, that would induce me to remain could I become Professor Jameson's successor in his professorship and keepership. Lyell, with the kindest of intentions, wrote to Mr. Cardwell of his own accord, and did not tell me that he had done so until afterwards. Playfair did the same without informing me. I have assured both that I cannot accept any office in preference. Lyell does not know how we stand here, and has never felt the horrors of being slowly strangled by red-tape—a process of slow torture and eventual death we are undergoing in this place. Playfair knows better, but wishes me to stay if possible, though unable himself to point out any possible inducement. . . . If Jameson's retirement had been effected, or even if it were to happen within the next fortnight, *i.e.*, by the commencement of the Edinburgh session, I intended to have arranged my movements as follows:—To have asked permission to deliver a three months' course in Edinburgh *this winter*, commencing in February, and to have remained in London till then, completing my Government course which should have begun in January, commencing it in No-

vember instead, so as to have caused no embarrassment to the Jermyn Street schools. As it is, I shall make no permanent settlement this winter in London, but keep my engagements open in such a way that I may be ready, if called upon, to give the summer course (commencing in May) in Edinburgh. But there are many reasons why I would prefer the matter settled *now* if possible. . . .

"I hope this long screed will convince you that I am thoroughly in earnest about getting the Edinburgh Chair. Ever, my dear Mr. Horner, very sincerely yours, EDWARD FORBES."

During these weeks of suspense, Mrs. Forbes and the two children remained at Hythe, in Kent, the Professor going down now and then to see them, and to breathe the sea breeze. Until the settlement of the Edinburgh Chair, one way or other, he had resolved not to take a house for the winter in London. Now, however, that Dr. Traill had been appointed to read Professor Jameson's lectures during the winter session, nothing more would probably be done till towards the summer term of the Edinburgh College. He could, therefore, leave London without prejudice to his interests in the north.

He had delayed visiting Ireland, although the fossil collections in the Museum of Irish Industry stood greatly in need of his assistance, and Mr. Jukes had pressed him to come over to help the Survey. Feeling himself at liberty to do so now, he left London in the beginning of November, and remained in Dublin ten days. Writing of this visit, Mr. Jukes says: "Although the fossils were then in a complete chaos, and the gallery cases only just finished, yet such was the easiness and quickness with

which he worked, that he had arranged every specimen with his own hands, and all were in their places, with descriptive cards, before the end of a week."

This done, he speedily found his way back to London, and after a visit to Ryde to be present at the marriage of his brother-in-law, and to the Isle of Wight to examine the Osborne sections which he had not yet seen, he collected together all the notes and material necessary for the memoirs on the two great fluvio-marine series of Purbeck and the Isle of Wight, as well as his presidential address to the Geological Society, and betook himself to Hythe, there to elaborate his papers in the quiet of his own family, and away from the turmoil of London. He found that in this way he got "more written in a day than in a week at the Museum." Coming up occasionally to town, to attend meetings, he still made the sea-coast his head-quarters during the remainder of the year and the first few days of January. One of the visits which he paid to the Metropolis was on the last day of the year, to dine with Professor Owen, and a scientific party at the Crystal Palace, inside the model of the Iguanodon, which had just been finished, and this, Forbes pronounced to be "a good wind-up for a geologist's year." Another object he had in London was to secure a furnished house; this he succeeded in obtaining at 84, Wimpole Street.

The first part of the course of lectures at the School of Mines lasted till Easter, and when it came to a close he was only too glad to take a vacation of three weeks in France. On getting back to London he wrote, 28th April 1854,—

"DEAR JUKES,—Prestwich, Austen, Sharpe, and I,

started on the day before Good Friday for France, to explore the district called the Pays de Bray. My object was to search for Purbecks, and to see the nearest bed of tertiaries to the Isle of Wight ones. We had beautiful weather and great success. Had I more time, I would tell you of the results.

"We came back on Sunday, and I was somewhat surprised at hearing of Jameson's death, which, ill as he was, I did not think was so near at hand.

"After stating the case to Sir Henry, and consulting Horner, Lyell, Murchison, Sir J. Clark, Austen, and other staunch friends—all except Lyell of one mind—I felt it my duty to apply for the post, though not without a pang. Success is probable, but by no means certain. However, I shall be settled one way or other, which will be a comfort either way."

On the evening of the same day on which this note was written, he gave his well-known lecture to the Royal Institution, "On the manifestation of Polarity in the distribution of organized beings in Time." The theory announced in this lecture will be alluded to on a subsequent page.

An interval of harassing suspense followed the announcement of Professor Jameson's death. On the 2d of May, Forbes writes a few hurried lines to Mr. Jukes:—

"You can fancy," he says, "how tremendously I am pressed at present in consequence of this Edinburgh business, which is still unsettled, and which may call me away at a moment's notice. Indeed, the Scottish authorities have run me into a fix, by saying that whoever is appointed will be obliged to take immediate duty. In that case I must leave my babes and their mamma in

town, and go at once to Edinburgh and do the course, getting Huxley to finish my labours here, and Bentley to do the same at King's College. In the meantime, this state of suspense is intolerable."

At last he reached the goal. The Professorship of Natural History in the University of Edinburgh was finally conferred upon him.

It came somewhat suddenly in the end, so much so, that he "was forced," he said, "to leave at a moment's notice." Writing of these movements to Professor Ramsay, he remarks:—"There were strong endeavours made for the other candidates, but I got in comfortably and speedily, and wished then to have been permitted to have finished my summer's work in London—an arrangement of which the [Edinburgh] professors were approvers. But the Town-Council, though the chair was a Crown one, resolved to have a finger in the pie, and had one very good for me, by unexpectedly memorializing the Home Office in my favour, a proceeding which probably gave a good excuse for setting aside the other applicants without ceremony. The Provost came to London, and contrived to get matters so arranged, in spite of me, that I was desired to go and take the summer duties at once, and to make the best arrangements I could for the London summer courses. With a house on my hand till August, many things to do, and a very doubtful prospect for the summer beginning so long after usual time, I did my best to oppose. . . . As it was, an interim arrangement was made that Huxley should finish my School of Mines' 'Principles' course, and Bentley the King's College lectures. I had a long sit with Mr. Cardwell, and have done my best to promote the interests of the School and Survey."

Many and varied were the expressions of regret that followed the announcement of his early departure from London. Nowhere were they louder than in the Geological Society, of which he still filled the presidential chair. At the last evening meeting of that Society previous to his leaving for the north, a scene occurred showing how close and warm was the sympathy between the President and the Fellows. When the scientific business had been concluded, Sir Roderick Murchison rose, and after referring to Forbes's early connexion with the Society, and the numerous valuable papers and memoirs with which he had since enriched its Transactions, announced that before the return of another meeting their distinguished President would have entered upon another and distant sphere of labour. Sir Roderick, who had been among the first of the geologists to perceive and acknowledge the merit of his friend, dwelt gracefully on what was not the least remarkable feature in the connexion of Edward Forbes with the Society—his generous cordial intercourse with all, and his power of attaching every one to him. Forbes rose to reply, but his feelings overpowered him. "I thank you," followed by a gush of tears, told best his sense of the esteem in which his colleagues held him.

And so, on the 13th of May, bidding adieu to London, with its toil and turmoil, its constant demands on his time and thought, its circles of acquaintance and friendship, and all its pleasant associations, gladly, and yet not without a pang, he set out to take his place as a Professor in the University which, rather more than two-and-twenty years before, he had joined as a student.

CHAPTER XV.

THE CHAIR OF NATURAL HISTORY AT EDINBURGH.

Before following the course of Edward Forbes to the goal of his ambition at Edinburgh, it may be well to pause for a few pages in order to look back upon the work which he accomplished during his residence of eleven years in London.

It may be doubted whether a biographical Memoir is the fitting place for a critical estimate of a man and his work. At least it rarely happens that in such a place the estimate is an unbiassed one. The biographer who has made it his duty to search into all the personal details of the subject of his memoir, who has had before him for many months the picture of a human life with its early promise, its struggle into manhood, its toils and battles, its hopes and fears, its friendships and sympathies, and then, perhaps, its sudden and premature setting, can hardly hope to be impartial. Work, the record of which is but scanty, and its recovery, therefore, a task of no little labour, is apt to be over-estimated, and that which, if done by another man, would have been regarded as of little import, comes to possess an interest above its own when performed by him whose course the biographer has been tracing.

The writer of these pages can lay no especial claim to impartiality, and he is, moreover, too sensible of his inability to cope with the subject, to presume to offer here a critical estimate of Edward Forbes. That must be done by an abler pen, when the work which the great naturalist accomplished has had time to spring up and bear its rich harvest. There are some features of this work, however, which may find fitting mention here.

At the close of the narrative of his Ægean excursion, reference was made to the general character of his scientific researches up to that time. We saw how, eminently a biologist from his earliest days, he had first pursued botany, chiefly with reference to the distribution of plants, and then how he passed to the study of the geography of animals. The transition from these fields of inquiry to that of palæontology or zoo-geology was natural and easy. He had in this manner become, to some extent, a geologist before quitting Edinburgh, not merely by collecting rocks and minerals, but in a far broader and more philosophical way, by connecting the distribution of plants and animals with geological speculations. His tour in the East greatly widened his experience, and showed him more clearly than ever how much still remained to be done in weaving geology and the biological sciences more closely together.

It was in this task that the greater part of his London life passed away. True, he found time during those busy years for some purely zoological work, as his *History of British Mollusca*, and papers and monographs for the Ray and Linnæan Societies, abundantly testify. His summer holidays, too, were frequently spent cruising

along our shores with the dredge—an instrument which he first methodized as an implement of zoological research, and brought into extensive use by inducing the British Association to form a Dredging Committee. In these summer excursions, while refreshing his memory as regarded the details of the mollusca or radiata on whose description he happened at the time to be engaged, he often added new forms to the marine fauna of the British seas. But his zoological work during his life in London arose mainly from the researches of his earlier years.

Although so long Professor of Botany, Edward Forbes, after he came to London, did almost nothing in the way of strictly botanical work. He read a few minor botanical papers at the British Association. But his most important contribution to botany arose not from the botanical but from the geological side.

It was chiefly in the domain of zoo-geology, to use his own phrase, that he passed his public life; and it is mainly as a zoo-geologist or palæontologist that he will take rank in the annals of science. His palæontological work, however, did not consist of mere descriptions of fossil species. These he regarded only as part of the preliminary ground-work of palæontology, and he ever strove to rise above them to the broader scientific questions to which they led.

His zoo-geological researches were marked by two eminently characteristic features:—In the first place, by a habit of constantly reading bygone eras of existence by the light of the present one, not only for the elucidation of zoological details, but for the comprehension of the

ancient physical conditions of land and sea. Just as his botanical and zoological labours had been chiefly directed to the distribution of living plants and animals, and the laws by which that distribution is regulated, so in palæontology he sought to ascertain from his knowledge of the existing creation, what had been the former distribution of other tribes of plants and animals, what the circumstances under which they lived, and how far they in turn threw light on the grouping of the tribes now living. In the second place, his palæontological work was characterized by its broad generalizations. No fact stood long single and isolated in the mind of Edward Forbes. He had a remarkable tact in discovering the bearing of detached phenomena on each other, and their relations in the general economy of nature. Hence he delighted to generalize his observations, and to speculate, after his own imaginative fashion, upon questions of the deepest interest to man, alike in his relations to the outer world and to the Creator.

As an illustration of the first of these characteristic traits of his zoo-geological researches, reference may be made here to his remarkable paper "On the Connexion between the Distribution of the existing Fauna and Flora of the British Isles, and the Geological Changes which have affected their Area, especially during the Epoch of the Northern Drift." Taking for granted the truth of his doctrine of *specific centres*, that is, geographical points from which the individuals of each species have been successively diffused, the problem which presented itself to Edward Forbes was to account for the present assemblage of plants and animals in the

British Islands,—a problem which had never yet been propounded by any of the geologists or botanists who had treated of the distribution of our indigenous fauna and flora. He believed that the plants and animals of Britain could, for the most part, only have come by migration, before the isolation of our islands from the Continent, and he sought to trace out the history of this migration. Grouped according to their geographical distribution, the plants naturally ranged themselves into five well-marked assemblages, or floras.

1*st*, There is a small area, embracing the mountainous districts of the west and south-west of Ireland, and containing plants which are also found native in the north of Spain.

2*d*, In the south-west of England and south-east of Ireland, a group of plants occurs, not elsewhere seen in the British Islands, but intimately related to the flora of the Channel Isles and the neighbouring part of France. Certain species of mollusca are peculiar to this region.

3*d*, In the south-east of England, the vegetation is distinguished by the presence of a number of species also found on the opposite French coast. The peculiar character of the entomology of the south-east of England, and also that of the pulmoniferous mollusca, are intimately connected with the presence of this flora.

4*th*, The summits of our mountains yield a peculiar assemblage of plants, which increase in number as we proceed northwards, all of them being identical with Scandinavian species. The fauna of these mountain regions, so far as developed, bears the same relation to more northern countries.

5th, The fifth and general flora of the British Islands, everywhere present, alone or in company with the others, is identical, as to species, with the flora of Central and Western Europe, that which may be properly styled *Germanic*. The fauna accompanying this flora presents the same peculiarities, diminishing towards the north and west.

Such being the present grouping of the plants of the British Islands, it became an interesting question to investigate the causes that produced this distribution, and the geological epoch during which it took place. It undoubtedly arose chiefly during a period anterior to that of man, and there could be as little hesitation in assigning to it a later date than that of the older Tertiary formations, when palm-trees flourished over the site of south-eastern England, and turtles and crocodiles haunted the neighbouring waters.

The great mass of the British flora, as well as of the pulmoniferous mollusca, being Germanic, Forbes showed that it had migrated from the Continent during the post-pliocene period, after the bed of the glacial sea had been elevated so as to form a land passage between England and the Continent. Proceeding across the British Isles, the number of species of Germanic type diminishes as we go westward, and increases when we cross the German Ocean. Hence the eastern counties present certain botanical and zoological peculiarities, dependent on Germanic plants and animals that have been arrested in their range, while the fauna and flora of Ireland and Scotland are marked by the presence of plants and animals not of Germanic type, or by the absence of English species, which are.

But though the migration of plants and animals over the great Germanic plain accounted for the major part of our British species, there was still a considerable flora, and a portion of our fauna, which could not be traced to such a source, seeing that they are inhabitants, not of the ancient west of Europe, but of Scandinavia. These Alpine species could not have found their way to the British Isles after the Germanic forms, for their areas had then become isolated on mountain-ranges. Geological evidence clearly proved that the central and northern parts of the British Isles, along with the Germanic plain, had at one time been covered with an Arctic fauna and flora. This was the Glacial period, when an intense cold prevailed over Central and Northern Europe, and icebergs, bearing mud and stones, were drifted southwards from the frozen north. During a part of this era, Forbes maintained that our mountains rose above the sea as scattered islets, having a northern vegetation, and that as the land rose, and these islets became isolated mountain tops, the Alpine plants remained only on the high ground, while the great Germanic flora spread itself over the lower plains and valleys, and dispossessed the Arctic forms as the climate grew milder.

There still remained three limited assemblages of plants and animals,—1*st*, That of Kent; 2*d*, That of Devon; and 3*d*, That of the west and south-west of Ireland,—all derived from continental regions south of the great Germanic group. The Kentish and Devon floras, according to Forbes, must have migrated (probably at two periods anterior to the Germanic migration) from

the north-west and west of France, across a tract of land now destroyed. But perhaps the most remarkable of all the floras was that which he numbered I., characteristic of the south-west and west of Ireland. The peculiar plants of this region were found to be identical with species either confined to, or abundant in, Spain and Portugal, especially in Asturias. No marine currents could account for their transmission, nor could they have been conveyed as seeds through the air. The hypothesis which Forbes proposed was, that at a period greatly earlier than that of the origin of any of the other floras, there existed a tract of land between Ireland and the Peninsula, across which the Spanish vegetation crept towards the north-west. Of this flora, indeed, only the hardier species have survived, but these are distinct from those of any other part of the British Isles.

By a similar process of reasoning, he showed, in the second part of his memoir, how the present fauna of the British seas probably originated. It is impossible to do more here than merely refer to his speculations on this subject, so well known to geologists for their shrewdness, and the high interest which they possess in helping us to connect our present marine fauna with that which witnessed the latest geological changes that affected the area of the British Isles. His announcement of the existence of "outliers" of northern species of mollusca in the deeper parts of our seas, formed another beautiful illustration of the law which he had discovered in the Ægean,—that parallels of latitude are represented vertically in the ocean, by zones of depth,

just as they are represented on land by zones of elevation.

The second feature described as characteristic of the zoo-geological researches of Edward Forbes, was a love for broad and often poetic generalizations. In the memoir on the British fauna and flora this feature is especially prominent. The observations of other naturalists are combined with his own, in a generalization which gives them a meaning and importance that they never had before. The scattered facts of the zoologist and botanist are linked together in such a way as to throw light on the geological history of our country, and to indicate the existence of ancient lands that had long disappeared beneath the sea.

As a still more characteristic instance of this feature of his mind, it may be enough to point to his doctrine of polarity in the appearance of life upon our earth during the geological periods. The idea was a favourite one with him in the last year of his life. It concluded his presidential address to the Geological Society; it gave rise to a discourse to the Royal Institution; and it formed the subject of one of the last, if not the very last, lecture that he delivered.

Geologists are accustomed to subdivide the great series of stratified rocks into three groups, Primary or Palæozoic, Secondary or Mesozoic, and Tertiary or Cainozoic. To Forbes, however, it appeared that the two last groups formed but one, and he proposed to regard the geological record as made up of two portions only, the Palæozoic and the Neozoic, each of which represented a vast period in the past history of our planet.

When he considered attentively the arrangement manifested in the appearance of generic types during these periods, he was led to infer the existence of a general law dependent on what he called "the manifestation of the relation of Polarity."

"In the general aspect of the palæozoic world," he says, "contrasted with the worlds of life that followed, although all are evidently portions of one mighty organic whole, there seems to me to be something more than the contrast that depends on the loss or non-discovery of connecting links. There is more than we can explain by this theory. Granting for its support all facts capable of being so applied, there are residual phenomena to be accounted for, and which, as yet, have not been referred to any law that I know of. Doubtless a principal element of this difference lies in *substitution*, in the replacement of one group by another, serving the same purpose in the world's economy. . . . . Now in this substitution the replacement is not necessarily that of a lower group in the scale of organization by a higher. There is an appearance of such a law in many instances, that has led over and over again to erroneous doctrines about progression and development. The contrary may be the case. Now that we have learned the true affinities that exist between the Bryozoa and the Brachiopoda, we can see in these instances the *zoological* replacement of a higher by a lower group, whilst in the former view, equally true, of the replacement of the Brachiopoda by the Lamellibranchiata, a higher group is substituted for a lower one. Numerous cases might be cited of both categories.

"But can we not find something more in these replacements and interchanges than mere *substitution*, which is a phenomenon manifested among minor and major groups within every extended epoch? Is there no law to be discovered in the grand general grouping of the substitutions that characterize the palæozoic epoch when contrasted with all after epochs considered as one, the Neozoic? It seems to me that there is, and that the relation between them is one of contrast and opposition, —in natural history language, is the relation of POLARITY.

"The manifestation of this relation in organized nature, is by contrasting developments in opposite directions. The well-known and often-cited instanee of the opposition progress of the vegetable and animal series, each starting from the same point, the point at which the animal

and vegetable organisms are scarcely, if at all distinguishable, may serve to illustrate the idea, and make it plain to those to whom the use of the term POLARITY in geological science may not be familiar. In that case we speak of two groups being in the relation of polarity to each other when the rudimentary forms of each are proximate, and their completer manifestations far apart. This relation is not to be confounded with divergence nor with antagonism."[1]

"The maximum development of generic types during the Palæozoic period was during its earliest epochs; that during the Neozoic period towards its later epochs. And thus, during the Palæozoic period, the sum of generic types and concentration of characteristic forms is to be observed in Silurian and Devonian formations; during the Neozoic period it is during the Cretaceous, Tertiary, and present (itself part of the Tertiary) epochs that we find the maximum development of peculiar generic types (or ideas). On the other hand, during the closing epochs of the Palæozoic and the commencing epoch of the Neozoic period, there was a poverty in the production of generic ideas, with few exceptions the species of the epochs in question being members of genera that form constituents in the assemblage, accumulated during the epochs of maximum of generic types or ideas.

"The following table may render my meaning more evident :—

Neozoic period.	Present and Tertiary epochs	Epoch of maximum development of Neozoic Generic types.
	Cretaceous epochs	
	Oolitic epochs	Intermediate.
	Triassic epochs	*Epochs of poverty of production of Generic types in Time.*
Palæozoic period.	*Permian epochs*	
	Carboniferous epochs . . .	Intermediate.
	Devonian epochs	Epoch of maximum development of Palæozoic Generic types.
	Silurian epochs	

"Before the Silurian and after the *commencement* of the present, no special creations of generic types have as yet been shown to be manifested. In the system of life of which all known creatures living or extinct, so far as our knowledge extends, form a part—and there is a consistency in its co-ordination that suggests the probability of our being acquainted with its extremes—the creation of the fauna and flora of the oldest Palæozoic epoch would seem to be the primordial, and the appearance of man the closing biological events.

[1] Anniversary Address to Geological Society, 1853.

"There may appear to be a contradiction involved in the expression *manifestation of polarity in time*, for since time implies sequence or progression in one direction only, how can we connect with time an arrangement that involves the notion of progression in opposite directions, proceeding from a median zero ?

"But time is an attribute with which man's mind invests creation ; a mode of regarding Divine ideas, necessary for the conception of them by our limited faculties, and forming in itself no part or essence of the Divine scheme of organized nature. We speak of Polarity in Time, for want of a better phrase : but this polarity, or arrangement in opposite directions, with a development of intensity towards the extremes of each, is itself, if I am right in my speculations, an attribute or regulating law of the divinely originating scheme of creation, therefore strictly speaking independent of the notion of time, though perceptible by our minds only in connexion with it." [1]

In making public this hypothesis, its author admitted that it could at that time be received as no more than a suggestion, one, however, which was based on a vast number of individual facts, and a wide series of investigations. And though it has not found much favour in the eyes of his contemporaries, it seems only fair to the memory of the great naturalist that the last, and, perhaps, most beautiful of all his speculations — one on which, towards his close of life, he seems to have dwelt with especial fondness, but which he never lived to illustrate and defend—should find mention in this Memoir of his labours.

Edward Forbes, from the beginning of his career onwards to its close, was remarkable for constantly looking at nature, not as a mere piece of mechanism, obeying certain laws, and effecting certain results, but as a great visible manifestation of the ideas of God. No one could

[1] Royal Institution Reports, April 1854.

be further than he from the habit of introducing the Divine name, as is so often rashly done, into descriptions of natural objects, almost as it were for the sake of effect. Nothing roused his indignation more than what he called "Bridgewater writing,"—well-meant, but foolish expositions of the argument from design. Rightly viewed, no one part of creation shows more than another of the wisdom and goodness of the Creator. As His work, and as "having passed that general visitation of God, who saw that all that He had made was good, that is, conformable to His will, which is the rule of order and beauty,"[1] there can be no object in nature that does not equally manifest the design of its author. But Forbes loved to deal with the organic world as a world of type and symbol—an embodiment of the thoughts of the Creator. A genus was to him a Divine idea that existed in its perfect form in the mind of God alone, and was only dimly shadowed forth to us. A species he regarded as the visible and individual, though partial manifestation of a generic idea, and the sum of all the species of a genus as comprising all that man could know of the meaning of this idea.

Thus every grade of organized being came to have a peculiar significance. To the Platonic mind of Forbes it was an outward type of an inner Divine thought. But more than this, it did not stand isolated and unconnected, but was linked by a thousand ties to all other parts of the animate and inanimate world. "How many and how curious problems," he says, "concern the com-

[1] Browne's *Religio Medici*, I. xvi.—A favourite book of Edward Forbes during his student life in Edinburgh.

monest of the sea-snails creeping over the wet sea-weed! In how many points of view may its history be considered! There are its origin and development, the mystery of its generation, the phenomena of its growth, all concerning each apparently insignificant individual; there is the history of the species, the value of its distinctive marks, the features which link it with the higher and lower creatures, the reason why it takes its stand where we place it in the scale of creation, the course of its distribution, the causes of its diffusion, its antiquity or novelty, the mystery (deepest of mysteries) of its first appearance, the changes of the outline of continents and of oceans which have taken place since its advent, and their influence on its own wanderings. Some of these questions may be clearly and fairly solved; some of them may be theoretically or hypothetically accounted for; some are beyond all the subtlety of human intellect to unriddle. I cannot resolve in my mind the many queries which the consideration of the most insignificant of organized creatures, whether animal or vegetable, suggests, without feeling that the rejection of a mystery because it is a mystery is the most besotted form of human pride."[1]

Such were some of the favourite paths of speculation in which Edward Forbes delighted to wander, and it was with the hope of following them out, and evolving thereby a broader philosophy of natural history, that he longed for a life of greater leisure. But the leisure never came, and we can only conjecture, from the jottings and fragments which he has left, how much he might have

[1] *Nat. Hist. Europ. Seas*, p. 13.

achieved had his life been prolonged. Enough, indeed, remains to place him in a high rank in the annals of science. His mind had at once that acuteness and breadth which enabled him to appreciate the nicest analogies and affinities, and to soar into the widest generalizations, to perceive the nature of the minutest details of structure, and yet never to lose sight of their bearing on the higher questions of natural history. Hence, in his works, we find a constant passage from what might seem unconnected facts to some hypothesis or speculation that links these facts together, and gives them significance. If he erred, it was from an over-anxiety to reach the meaning of isolated observations, which sometimes, perhaps, led him to theorize on too narrow a basis, and to over-estimate the value of negative evidence.

From this tendency, his published works are rather suggestive than demonstrative. Measured by what he actually did in natural history, his name cannot be placed where some of his warm friends would inscribe it, along with those of Aristotle, Linnæus, Cuvier, Owen and Goodsir. But it would be unjust so to estimate him. It must be remembered that he passed away ere reaching his prime, and he must be tried, not merely by what in his short lifetime he did himself, but by the ideas which, scattered by him broad-cast over the world, have sprung up and are bearing fruit in many lands. He did more, perhaps, than any other man of his day to spread abroad a love for natural history; more, undoubtedly, than any one of his contemporaries to indicate how [illegible] and geology must be woven together.

The name of Edward Forbes will go down to posterity inseparably linked with the history of palæontology, as one of the greatest naturalists that ever strove to bring his knowledge of the living world to elucidate the physical and organic changes in the past history of the earth.

He attained this high eminence not as a solitary worker. In nothing was his career more marked than in the power he possessed of interesting others in his field of labour. His broad philosophical spirit enabled him to appreciate the researches of the chemist and the physicist, and in return he drew their sympathy with him into his own domain. In bearing down all jealousy and envy among his fellow-naturalists, and enlisting their active co-operation in the common cause, he stood forth conspicuous among the scientific men of his time. And this he accomplished not so much by the weight of his authority in matters of science, as by the influence of his manly true-hearted nature. On no phase of the life of Edward Forbes does it seem needful to lay greater stress than on this, for on no other ground can we account for the great influence which he exercised not in scientific circles only but in society at large. It was not his mental powers, great though these were, nor his vast knowledge of those branches of science which he made his especial study, that gained him the love and respect of all men, but a simple kindly heart that knew no selfishness, and embraced in its wide and generous sympathy all that was honourable and good.[1]

[1] These features of his character were dwelt upon immediately after his death, in many of the obituary notices written by his friends. Nowhere were they more eloquently expressed than in one [illegible] tribute to his memory, in [illegible] recognise the vi[illegible] greatest livi[illegible]

Although such summary remarks as those which have been offered in the preceding part of this chapter are usually deferred until the end of a biography, they appeared naturally to suggest themselves from a consideration of the period in the life of Edward Forbes to which we have now come. As the close of his student days defined that part of his career, which was almost wholly devoted to Zoology and Botany, so the end of his London life, some of the characteristic traits of which have been sketched in the foregoing pages, terminated that second portion, which was as exclusively given to Palæontology and Zoo-Geology. It was in London that he made himself famous, and from the work which he accomplished there must his place be determined in the bead-roll of science. No man could have so predicted at the time, and by none was it anticipated so little as by Forbes himself. In leaving London for another sphere of labour, he meant that the nature of his work should also, to some extent at least, be changed. To

merating some of the leading features of Forbes's mind, this writer goes on to say:—"It was not these qualities which distinguished him so highly beyond his fellows. To say that he had them will not enable those who stood without the privileged circle of his friends to comprehend why, within that circle, the old mourn him as a son, and the young as a brother. It is not because he was so gifted that the veterans of science one and all affirm his loss to be irreparable; and the aspirants know that they may succeed, but cannot replace him. Our affections cling to character and not to intellect; and rare as was the genius of Edward Forbes, his character was rarer still. The petty vanities and heart-[illegible] are the besetting sins of [illegible] men of letters, had no hold upon his large and generous nature; he did not even understand them in others. A thorough spirit of charity—a complete toleration for everything but empiricism and pettiness, seemed to hide from him all but the good and worthy points in his fellowmen. If he ever wronged a man, it was by making him fancy himself better than he was. Worked to death, his time and his knowledge were at the disposal of all comers; and though his published works have been comparatively few, his ideas have been as the grain of mustard seed in the parable—they have grown into trees and brought forth fruit an hundredfold; but he never seemed to think it worth while to claim his share."—*Literary Gazette*, 25th November 1854.

Edinburgh he returned full of hope. He resolved to free himself from the restraint under which geology had too imperiously bound him, and to resume once more, amid the scenes of his youth, those natural history pursuits on which he had raised the foundations of his fame. In quiet and leisure he hoped to reduce to order and to writing the vast mass of knowledge which he had gathered during these busy years, and to elaborate those broad philosophic views of the connexion of the natural history sciences to which his observations had gradually led him. How he entered upon this work we have now to see.

Few men were ever called to a University chair amid such general gratulations as now hailed the advent of Edward Forbes to the Natural History Professorship at Edinburgh. From all parts of the country his old class-fellows repaired to their *Alma Mater* to do him honour. There was no party difference to mar the harmony of the re-union. The universally admitted genius and range of acquirements of the new Professor disarmed all petty cavilling, and there arose one unbroken note of joy and welcome. On the 15th of May, the largest class-room of the University was filled to overflowing. Crowding the benches were youths who had heard of the fame of the great teacher, and who had come early to make sure of catching the first accents of his voice; others having long known and studied his works, now

the man who had instructed and delighted them. Here and there, too, among the crowd was an older head, one that had been young when Forbes himself was a fellow-student in the same class-room many years before. These, with his readiness of memory, he speedily recognised. Around him were some of those who had been professors when he was still a wayward student; some of his old fellow-students had risen to assume the professorial gown, and were now at his side to give him a hearty welcome into their number. He stood at the head of a school, and as the successor of a man of European reputation. The dream of his youth, when he used to sit on these very benches, was now realized. All the associations of the past, and all the glorious anticipations of the future, passed rapidly in review as he rose to deliver the inaugural address.

When we reflect upon the state of mental excitement in which he had spent the last few weeks of his London life, and the suddenness of the call to lecture in Edinburgh, we cannot but marvel at the thoughtfulness as well as the dignity of his opening discourse. Its early part was full of reference to his own student days at Edinburgh, and the character of the natural history studies there pursued. After expounding his views of the true method of teaching natural history by the exposition of its principles, the value of this science as a means of intellectual training, and its inter-connexion with the sciences that deal with extinct organisms, how gracefully and with what measured dignity does he conclude by pronouncing the Eloge of his old master into [redacted] now ascends!—

"But the hour is shortening, and I must conclude. After many years of study, and travel, and precious opportunities for acquiring experience, I return to the city where I was first initiated into the science of nature, and where within these walls I learned those lessons of patient inquiry and minute observation, to whose working and training I am indebted for the place that I now hold among the Professors of my *Alma Mater*. To my illustrious predecessor and master who passed from amongst us ripe in years, honours, and fame, so lately, I gratefully record my acknowledgments for the encouragement of those tastes and the founding of that knowledge which have proved to me a chief delight. Who, that in time past was his pupil and found pleasure in the study of any department of natural history, can ever forget his enthusiastic zeal, his wonderful acquaintance with scientific literature, his affection for all among his friends and pupils who manifested a sincere interest in his favourite studies? When, in after life, their fates scattered them far and wide over the world, some settling amid the civilized obscurity of rural seclusion; some rambling to the far ends of the earth to sift and explore wild savage regions; some plunging into the boiling and noisy whirlpool of metropolitan activity; none who remained constant to the beautiful studies of his pupilhood was ever forgotten by the kind and wise philosopher, whose quick and cheering perception of early merit had perpetuated tastes that might have speedily perished if unobserved and unencouraged. The value of professorial worth should chiefly be estimated by the number and excellence of disciples. A large share of the best naturalists of the day received their first instruction in the science that was afterwards to prove their fountain of honour from Professor Jameson. Not even his own famous master, the eloquent and illustrious Werner, could equal him in this genesis of investigators. Under his auspices, too, were lasting friendships and unions of kindred minds formed that have been productive in good to the cause of knowledge. Valuable as were his writings—each, when estimated with regard to the position of science at the time of its issue, an effective advance—his pupils were even more valuable. The greatest praise of a great Professor is that which proclaims he has founded a school. And where else in the British empire, except here, has there been for the last half century a school of Natural History? I have a difficult task before me, gentlemen, with those traditions of greatness to overshadow my endeavours. But since this most honourable and responsible office has been placed in my ch[illegible]

to which a British naturalist can aspire—with God's blessing and your assisting exertions I will endeavour fully and fairly to do my duty."

His first experiences of a return to Edinburgh are best told in his own words. To Mr. Ramsay he writes, 11th June 1854:—

"I have given three weeks of daily lectures, except on Saturdays; hard work, as I have to find where everything in the way of illustration is, and I spend hours in chalking and painting extempore diagrams and tables. But I shall go through with it, and a large class is wonderfully inspiriting. My class-room (fitted up capitally, except ventilation, and exclusively mine—a great comfort) holds 200, and is filled every day. Of my audience I have 130 and odd paying students. Yesterday I took them out on a geological excursion, to give them some elementary notions in stratification, etc., in the sandstone quarries, and along the coast section. I marched at the head of more than a hundred fellows, most armed with hammers.

"Balfour had as many in another direction botanizing with him. We shall turn out a fine set of naturalizing youths by and by. So you see things look well here. And, after all, it is a great matter to feel quite free, and to be able to do what one likes, as long as the class duties are properly done and the museum flourishing. Those who talk of banishment forget how many clever men are here still. Independent of the doctors, here are old Fleming, Maclaren, James and George Wilson, Chambers, Greville, Aytoun, Blackie, etc. etc., and [redacted] way of poets, we have Alexander Smith. Then [redacted]ts with good stuff in them, old Watson

Gordon, a very fine genius, at their head. They seem all, too, to pull smoothly together, and there are capital materials for red-lionism.

"I am living in lodgings in Princes Street, all alone, for I cannot get rid of that rascally house in Wimpole Street, and dare not leave it for fear of some scrape. Mrs. Forbes and the children remain there for the present, and come here next month. We shall probably take a lodging at Granton alongside of James[1] and his wife, where I can leave Mrs. Forbes when I go to town in August. I hope to find a house to settle in before October, but will be up to the Liverpool meeting in September."

The reference to "Red-lionism" in this note is eminently characteristic. The "capital materials" were very soon made available, for on the 14th June, exactly a month after his arrival in Edinburgh, he announces a Red Lion dinner to take place at the Café Royal on the same evening that the metropolitan "Lions" met in Anderton's Hotel. The first meeting consisted of six, all either metropolitan or association "Reds," who formed the nucleus of the Edinburgh tribe. They spent, as Forbes expressed it, "a very jolly evening of the right sort."

The extent and value of the collections in the Museum of the Edinburgh College filled him with astonishment. "I find Jameson's collection wonderful," he said, "even palæontologically, and brought up by judicious purchases to the last moment." Again,—"The amount of material for illustrating the course here is very great, and the details of the lecture-room very complete."

Often before coming to Edinburgh he had expressed

[1] Col. Sir Henry James, R. E.

his belief that the Museum and the natural history school there might be made, perhaps, the first in the world for educational purposes. His love for a trinity of things found a place here too, and he spoke of his colleagues, the Professors of Anatomy and Botany, uniting with himself as a triad that would make Edinburgh famous. His own part of the scheme he commenced with vigour and success. The collections in the Museum stood greatly in need of re-arrangement. Many of the most valuable and illustrative specimens were stored away in inaccessible drawers and boxes, and in the general disposition of the Museum, too much regard was had to artistic arrangement, and too little to scientific order. To the thorough re-modelling of this noble collection Forbes now deliberately addressed himself.

In the lower room of the Museum some attempt was made to group the stuffed specimens of Vertebrata according to their natural orders, as far at least as was compatible with a good general effect. In the principal room, though many important changes were planned, the collections were yet in great measure left untouched. Some minor modifications deserve notice. For the purpose of illustrating his lectures he placed in a small glass cabinet in the centre of the apartment, selected examples of the genera that formed the subject of the previous day's lecture. The students had thus an opportunity of examining in detail specimens which it was impossible fully to describe in the class-room, and which, owing to the distance of the hearers from the lecturer, could not be adequately understood by them. When not used for the [illegible]he lecture, this special cabinet was appropri-

ated for the display of rare, or otherwise interesting specimens recently added to the Museum.

He made abundant use of his pencil in these arrangements, sketching restorations of fragmentary organisms or diagrams of anatomical structure on small cards affixed to the specimens. Thus in depositing a series of bones of the gigantic extinct bird called the Dinornis, he drew a rough sketch to show the relative size of that ancient denizen of New Zealand as compared with the living Cassowary. In the rendering of geological sections his hand was peculiarly happy. Two of these still illustrate the series of typical specimens of the igneous rocks of the neighbourhood of Edinburgh, which he arranged in a small recess of the principal room; and one of them, a bold and ingenious restoration, shows the relative ages of the volcanic masses of Arthur's Seat.[1]

The long narrow room up-stairs called the "Upper Gallery," was intended to become eventually the repositary of a British Zoological collection. In the meantime Forbes made it available for the illustration of types of all the leading divisions of the Animal Kingdom, in regular series from the Protozoa to the Mammalia, illustrative cards with occasional pen-and-ink sketches of generic distinctions being interspersed among the orders.[2]

The popularity of his lectures was very great. Four

[1] In the section here referred to, Forbes shrewdly conjectures that the later rocks of Arthur Seat were so far separated from the older ones as to merit being classed with the Tertiary deposits. He was possibly led to this by the association of igneous rocks with the miocene (?) leaf-beds of Mull. The posteriority of the one series to the other had been admirably shown by Maclaren (*Geology of Fife and the Lothians*, Edin. 1839) and has since been still further demonstrated from an enlarged basis of evidence by one of the writers of this biography in the Memoirs of the Geological Survey.

[2] Information communicated to Professor George Wilson by Dr. Spencer Cobbold.

days a week he lectured on Zoology, reserving the Fridays for geological exposition, and occasional Saturdays for excursions in the neighbourhood. It was his aim to present a general idea of the grouping and zoological value of the various families, orders, and genera, rather than to enter into the minute physiological details of any particular division. At the same time, we cannot wonder that by much the greater part of the first course was devoted to the invertebrata, his own special field, while the vertebrate division had to be hurried over towards the close of the session.

In unfolding the structure and relations of recent organisms he never lost an opportunity of enforcing the necessity of studying the extinct forms. Zoology and Palæontology, he insisted, ought never to be dissevered, the existing creation being but the last link of a great chain of which the previous ones lay entombed among the rocks. His geological lectures had special reference to the geology of the neighbourhood of Edinburgh, and were illustrated by copious suites of specimens as well as diagrams mostly drawn by himself.

One of the most memorable features of his lectures, was the ease, grace, and rapidity with which he drew on the black board the outlines of the animals he described, using coloured chalks to mark the different structural characters to which he wished to draw attention. The late Hugh Miller was an occasional auditor in the class-room this summer, and shared in the wonder with which these rapid impromptu drawings were always hailed. In [illegible]tch of Edward Forbes, which he inserted in the [illegible]er, he wrote, "The feeling comes upon

us in all its freshness, how in his recent summer course, when he was demonstrating the structure of those almost translucent marine creatures of which he was the prime expositor, the interest of his original descriptions was almost lost in the admiration of the beautifully graceful forms which seemed to arise, as if by magic, from beneath his long and delicate fingers, and how a murmur of applause was not refrained from by his admiring audience, spectators rather, they might then be called."[1] The dexterity too, with which, by a few touches, he corrected any error in the outline made while sketching, and continuing his exposition, was truly wonderful. On one occasion he was describing the delicately-whorled shell *Clausilia*, an old favourite that had delighted him on discovering it at Arthur's Seat during one of his first rambles when a student in Edinburgh. In rapidly drawing the outline of this species, Forbes perceived he had reversed the spiral, but immediately detecting his error, the lines were at once changed with the same ease and correctness of proportions.

No part of this summer course of natural history afforded more delight than the periodical excursions on alternate Saturdays, when, at the head of a hundred youths or more, armed with hammers, chisels, and other implements, Forbes traversed the country roads, rambled along the shores, or hired a steamer and visited some of the islands of the Forth. No one enjoyed these excursions more than himself, and he makes frequent reference to them in his letters. Thus, to Mr. Reeks on 11th July, he writes:—

[1] *Witness* of 22d November 1854.

"We had a great field-day on Saturday; 200 students (including the botanists, headed by Professor Balfour) in a steamer, with dredges, hammers, etc. etc., and a cold collation. The day was fine, and so many fellows jumped overboard when the steamer anchored, to swim ashore, leaving their clothes, that Inchkeith looked like an island inhabited by naked savages. James was with us, and we had a jolly party."

By the middle of July he had been joined by Mrs. Forbes and the children, and took a cottage at Wardie, near the coast, about two miles from Edinburgh. The last lecture of his summer course was given on the 26th of the same month, and he then concluded his first session by three days of field geology round Loch Lomond, with a select band of his students, augmented by a detachment of botanists from Professor Balfour's class. "After a hard struggle to keep up to the mark," he writes to Sir Roderick Murchison, "I have got through my summer's lectures, ending by taking my students for three days into the Highlands, to teach them how to observe in a mountain country. I have some promising young geologists among them, and fully expect to turn out some thoroughly good men in a year or two. Hammers and bags, chisels and clinometers, have come into sudden fashion, and threaten to rival botanical boxes."

The suddenness of his departure from London had, of course, left much in the Museum in Jermyn Street still unfinished. His Isle of Wight memoir, and some [illegible] of the Survey, formed part of the uncom- [illegible]rly in August, accordingly, after his

Highland ramble, he went to London, and remained there hard at work, until, at the end of the month, he had an attack of illness which warned him to get north again as speedily as possible. On the first of September he wrote a short note from the Edinburgh Museum to Mr. Ramsay :—

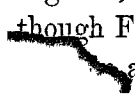
"After trying to work in the heat and poison of London, I succumbed, and on Sunday last was seized with diarrhœa and vomiting, so that I was glad to rush off on Monday to see David, and thence to come here. I shall, however, be at Liverpool. . . . I am much taken with Maclaren's name of 'calciferous sandstone,' applied to the series of beds between the Encrinite limestone and the true Old Red. This series includes the Granton, etc., building stones. The carboniferous slates of Ireland are equivalents.

"Fossils being rare, I am working hard at minerals, my old love for which is reviving, and with such a collection in my charge, I cannot help taking them up. Years ago I was as fond of them as afterwards of fossils, and all their old names seem to come up again."

With these studies in the Museum, he combined, during the early part of September, several short excursions from Edinburgh, as one—his last dredging day—with Drs. Balfour, Macdonald, and Wyville Thompson, to the coast of North Berwick, and another with Mrs. Forbes and his brother David to Loch Lomond. He also spent three days at Jardine Hall in Dumfriesshire, and during a geological excursion in that neighbourhood was exposed for some hours to a drenching rain which chilled him thoroughly, and was follow[illegible]

lumbar region, of which he continued to complain until his last illness.

The British Association was to assemble at Liverpool on the 20th day of the month, and he hastened to be present at the meeting. It was a fitting, though unforeseen close to his long and honourable connexion with the Association that now, when on the eve of quitting it for ever, he should obtain its highest sectional honour. He was elected to fill the President's chair in the Geological Section, and took his seat as umpire among veterans in the science — Lyell, Murchison, Sedgwick, Owen, and a band of younger, but widely known men, his own warm friends and comrades. For so young a man, the honour was at that time unique, but it fell to one whose tact and judgment were not less remarkable than his geniality. And such a chairman was peculiarly needed at this juncture, for it was known that the meeting would not pass away without a lively, possibly an angry debate. The vexed question of nomenclature, in which the two chiefs, Sedgwick and Murchison, differed, and which had been so keenly discussed already before the Geological Society, was to come up again at this meeting. The debate proved, indeed, a stormy one. Forbes found his friends ranged on different sides, and had, of course, his own decided opinion on the question. Yet in this delicate and difficult position, by the concurrent testimony of all present, he acquitted himself to the satisfaction of every one. And at the close of the meeting, Sedgwick, on whom a generous deed was never



though Forbes dissented from his views, pro-

a noble eulogium.

At this meeting Forbes read two papers.

1. On the foliation of some metamorphic rocks in Scotland.

2. On some points connected with the natural history of the Azores.

The first of these communications resulted from his excursion to Loch Lomond, and contained an expression of his belief, that the cleavage and foliation of rocks were the results of distinct processes. The second paper was suggested by the researches of Mr. Macandrew.

While in Liverpool, he remained with Mrs. Forbes and a pleasant party, at the hospitable mansion of Mr. Macandrew. Mr. Jukes, who was one of the guests, has furnished some notes of this meeting. "Forbes," he says, "got through the business of the section well, but often complained of exhaustion when he got back to dinner; and once or twice I observed him ask rather eagerly for port wine. There was, too, a somewhat worn and anxious expression in his face, and occasionally he complained of not feeling well. One evening, which we had anticipated would be spent without interruption in Mr. Macandrew's study, discussing a few scientific questions that had been long pending between us, was sadly encroached upon by a stranger, who, armed with note-book and pencil, had come to consult poor Forbes. The latter was kept on the stretch for full two hours, yet with the utmost patience and good humour he took pains to satisfy his unreasonable questioner, who, it appeared, was engaged in writing some book or treatise on Natural History, and had come fully determined to [illegible] could out of the President of the Geol[illegible]

the occasion of the Red Lion dinner at this meeting, Forbes presided with even more than usual of his wit, vivacity, and humour, making a most humorous speech in the character of the Scottish Lion, about the rights of which there had just then been a discussion in the newspapers."

In returning to Edinburgh, he spent a week in Dumfriesshire. On the 9th of October, he writes from the College Museum, Edinburgh :—

"DEAR JUKES,—We only got back on Saturday night. We divided the week between an old student and naval friend, who has had the luck of having a fine estate and house left him, and now sits in the midst of his books, delighting in Hebrew, Greek, and all the languages, and keeps open house, and Sir William Jardine, who keeps open house likewise. Harkness came on a visit to Jardine Hall, and we had a nice run over the geology of Dumfriesshire. I am now preparing for the coming session."

In another note of the same date to Sir Henry de la Beche, he expresses his belief that "certain beds which have been mapped as carboniferous in Dumfriesshire are really Permian."[1]

In his leisure moments during the autumn he had been engaged in a critique of Sir R. I. Murchison's "Siluria," which appeared in the October number of the *Quarterly Review*. As the last of his writings it has a mournful interest and meaning in the broad, generous spirit, which breathing through its pages, comes to us as

[1] [illegible]f Forbes, Mr. [illegible]e both extended the area of the Permian strata in the south of Scotland.

it were his latest legacy. His parting words addressed to the scientific world, seem like the embodiment of the idea of his whole life.

"The old Scandinavian gods amused themselves all day in their Valhalla, hacking each other to small pieces, but when the time of feasting came, sat down together entire and harmonious, all their wounds healed and forgotten. Our modern Thors, the hammer-wielders of science, enjoy similar rough sport with like pleasant ending. Men, whose work, both of head and hand, is done mainly under the broad sky, and along the craggy sides of mountains, heedless of weather and toil, are not likely to use mincing forms of speech, or mollify their sentiments when engaged in discussions, though all the time mildness and mercy are at the foundation of all their thoughts. Better men and truer, whether in field or council, there are not living than the two famous geologists, the nature of whose differences we have endeavoured to expound. They have worked long and well in co-operation, heart and hand united; and though the fortune of scientific war has led in the end to the crossing of their pens, the names of Sedgwick and Murchison will go down to posterity side by side, and bracketed together in the glorious list of benefactors of mankind through the advancement of science."[1]

He returned to Edinburgh some weeks before the opening of the winter session at the College. These he employed chiefly in preparing for his lectures and arranging the commencement of the New Philosophical Journal, formerly conducted by Profess[illegible]

[1] *Quarterly Review*, No. cxc. p

and now intrusted to the editorship of Dr. Anderson and himself. He had found great difficulty in obtaining a suitable house in Edinburgh, and had, in the meantime, engaged a furnished house for six months, from the 20th of November. This inability to find a "home" weighed, to a marked degree, on his spirits. At last the College opened on Wednesday the 1st November, and the Natural History class began on the same day.

The manifest weakness which had attracted the notice of his friends at Liverpool still continued, augmented, as he maintained, by the effects of exposure to wet and cold during his trip to Dumfriesshire. Although not nervous as a lecturer, his hand was observed to tremble as he raised it from the desk on which it often rested during the delivery of his introductory lecture.[1]

"He complained," says Dr. Bennett, "of chills and feverishness indicating, as he insisted, a return of his old enemy, the remittent fever he had caught in Greece, and for which he took quinine." But in spite of the urgent entreaties of some of his friends, he continued to lecture during the rest of the week, superintending the enrolment of his numerous students, and the arrangements of the Museum.

On Sunday the 5th, Dr. Bennett was summoned to his bedside, and found him labouring under slightly febrile symptoms with an accelerated pulse. Forbes had intended that day to walk with Mrs. Forbes to the Dean

[1] This lecture was found among his papers after his death, and printed in the *Edin. Phil. Jour.* (New Ser.) for January 1855. The indistinctness of [illegible]r, has led to the [illegible]any egregious typographical blunders. For example, on p. 155 it is stated that "natural history, *under its subsciences*, physics and chemistry," cannot do much for utilitarian interests, instead of "natural history, unlike its sister sciences."

Cemetery, which he greatly admired, and often visited, and which he said he should wish to be his last resting-place. But he found himself too weak for so long a walk. He insisted, however, on going to the College next day as usual, and such was his anxiety regarding the formation of his class, that he continued to lecture during the next three days. His weakness became still more perceptible in the class-room. Before commencing his prelection, he was observed by his students to mix up a white powder (quinine) in water, and drink it off with a trembling hand. On the Thursday he felt too ill to continue the duties of his class, and hoping that a few days of rest would restore him, he announced his intention of suspending his lectures until the following Monday. The febrile symptoms, however, continued to increase. On Saturday he wrote to the Professor of Botany :—

"DEAR BALFOUR,—My prospect of mastering my illness depends on my remaining a-bed to-day and to-morrow.

"The fifteen students of whom you wrote, have certainly not as yet entered my class. I have fifty-four fresh entries, of these not more than twenty-six or twenty-eight are medical. As each man has entered I have asked him what his pursuits are, and how the hour of lecture affects him." He then enters into the reasons for not altering the hour of his lecture, as had been proposed by some of his colleagues. "For my own part I hold that to change any one hour of lecture after the arrangements of the session are complete and advertised, is both deleterious and unbusiness-like. . . . The first consid[illegible]

the academical convenience; the next, the propriety, if there are to be changes, of announcing them in prospect a full session beforehand; the last, private convenience. —Ever, dear Balfour, most sincerely yours,

"EDWARD FORBES."

The repose from the fatigues of the class-room could not arrest the progress of the disease. He began on the Sunday to complain of obscure pain in his back, and it soon became only too evident that he was suffering from a nephritic affection of a very grave nature. Some matters of business which he had left incomplete continued to press upon his mind, especially the formation of his class, the preparation of the new edition of his Palæontological Map for Johnston's Physical Atlas, and the first number of the *New Philosophical Journal*. On Monday evening, with a hand that could scarcely hold the pen, he wrote, in hardly legible characters, his last note:—

"*Monday evening.*—DEAR BALFOUR,—I am completely shattered for the moment, and don't know how to get on with the Journal, being so ill. Could you look in upon me and advise. Come here, *i.e.*, Wardie. I am still in my bed.—Ever E. FORBES."

On Tuesday, when rising, he experienced sudden and acute agony, his pulse became rapid and weak, and he himself discovered the nature of the disease, remarking to his wife, "I know it will go very hard with me; it is the kidneys again." When Dr. Balfour went to see him [redacted] unable to speak. His old friend and fellow-Goodsir, was, with Dr. Bennett, con-

stant in his attendance in the sick-chamber, tending Forbes with a brotherly assiduity.

On Wednesday, Dr. Balfour found him "rather easier, and able to give directions about the papers for the Journal; he spoke with great anxiety about his pupils and his class, and gave a message to several of them." He would not admit that his illness was of a hopeless kind. He had been similarly prostrated before, he said, and believed he had enough of *vis* in him to weather this second attack. He could not bear to lose sight of his wife for a second. She sat with him, and wrote his letters, but he spoke very little.

On Thursday morning he appeared much better. Dr. Bennett and Mr. Goodsir having occasion to be in Edinburgh, Mrs. Forbes watched him alone all day. About dusk she saw a change come slowly over his features. Soon after this the doctors returned, and they were compelled at last to admit that no hope remained. He requested to know their real opinion of his case. When it was told him, he remained for a long while silent. "I was not ambitious," he said; "I hoped and wished for the Edinburgh chair because I thought I could do good there." He referred to his having been overworked, and to the anxiety the Town-Council had occasioned him by insisting on his leaving London so hurriedly to lecture in Edinburgh. He more than once reverted to this subject, on one occasion observing, with a touch of his wonted humour, "The bailies have killed the goose that laid the golden eggs."

On the morning of Friday he kissed the children before Dr. Christison took them to the hous

All day he continued to grow weaker, and his wife watched him alone. In the evening, her uncle, the Rev. Mr. Rooke, who had been telegraphed for, arrived, and wrote a short will, by which Forbes left his children under the entire care and control of his wife, his papers to Mr. Godwin Austen, and his natural history collections to the College Museum of Edinburgh. Mr Rooke then read prayers with him, in which Forbes joined. When his wife asked if he would like to receive the Holy Communion, "Very much," he said, "but I am too weak now."

The pain was in great measure gone, but the pulse grew feebler, and the face more pallid. In addition to the constant and devoted nursing of his wife, Mr. Goodsir and Dr. Bennett shared alternately the care of tending him, the former spending the night with him. On Saturday, Mrs. Hay (Mrs. Forbes's sister) arrived, and he expressed great gratification at seeing her again. From this time, however, he hardly spoke. His wife stood supporting his head, and repeating anything said in the room, for he seemed unable to hear any voice but hers. His face gradually wore a strange depth of expression, as if, in his profound reverie, he saw beyond this world. When recalled by being spoken to, his eyes closed, and a gleam of pain seemed to pass across his features. He suffered greatly from a feeling of suffocation, but otherwise there was no pain. Late in the afternoon, Dr. Bennett was obliged to leave him for a short time, intending to return with Mr. Goodsir in the evening, death, though plainly inevitable, was not looked for re quitting the room he gave some in-

structions in a whisper to the nurse, but these were cut short by Forbes, who interposed—"That will do, Bennett, no more of that," evidently meaning that all further efforts at restoration were useless. The end was now very near. Pressing his friend's hand, he said, referring to Mrs. Forbes, who had just left the room, "Be kind to her and the little ones." A return of the pressure, and the reply, "I will," assured him that all would be well with them. When his wife returned he was speechless. As she took his head again in her arm, he opened his eyes and smiled, and signed to her to kiss him. To her inquiry if he still knew her, he could only faintly whisper, "My own wife."

Another hour crept on, during which he said nothing, though his eye showed that he remained in the full possession of his faculties. And then, as twilight was deepening into dusk, the spirit passed imperceptibly away.

On the afternoon of Thursday the 23d November the Principal and Senatus of the University of Edinburgh, with a numerous band of students, the Lord Provost and Magistrates, in their robes of office, and a large concourse of the citizens, including followers of science from far and near, assembled to pay the last tribute of honour to the great naturalist. They met at the Dean Chapel, and thence moved sadly and slowly westwards to the Cemetery of the Dean, winding through the walks of that most sequestered of sleeping-places to a [redacted] tree-shaded slope that overlooks the de[redacted]

Water of Leith. And there, among the well-explored scenes of his youth; within sight of the sea, of whose wonders he was a prime expositor; within hearing of the hushed and mellowed hum of the city that had witnessed the efforts of his earlier years, and been from first to last the goal of his life and his cherished haven of rest; amid grief too deep for utterance, the earth closed over all that was mortal of Edward Forbes.

APPENDIX.

LIST OF PROFESSOR FORBES'S WRITINGS.

Date.	Subject.	
1831.	On some Manx Traditions, ...	Mirror.
1832.	On the "Man-Keeper" of Scott, ...	do.
1834.	On British Species of Patella, ...	University Journal.
	"Parting," a short Poem (*a Quiz*), ...	do.
	On the Phrenological Development of the Cheese-Mite.	do.
1835.	Natural History Tour in Norway (four Papers),	Loudon's Mag. of Nat. Hist. Ser. 1, VIII. 65, 249, 305; IX. 169.
	"University Maga," vol. i. (many articles by Forbes.)	
	Records of Dredging (three papers), ...	Mag. Nat. Hist. Ser. 1, VIII. 68, 591; IX. 191.
1836.	Note on Blennius Ocellaris, ...	Do., Ser. 1, IX. 203.
1837.	On the Comparative Elevation of Testacea in the Alps.	Mag. Zool. & Bot. 1837, I. 257.
	On a New British Viola, ...	Trans. Bot. Soc. Edin.
	On a New British Polygala, ...	do.
	The "Pint of Wine." A Song, ...	Manx Sun.
	Political Song, ...	Fraser's Mag. (April.)
	"Ducks and Green Peas," in Two Sonnets, ...	do.
	On New and Rare Forms of British Plants and Animals (read before the British Association, Liverpool), ...	Rep. Brit. Ass. Sect. p. 102.
1837-8.	"University Maga," vol. ii. (many articles by Forbes.)	
1838.	Letter on the "Snow-ball Riots,"	Edinburgh Advertiser.
	Six Songs on the University Riots, ...	Fly-leaves.
	Battle of the Quadrangle.	
	The Gallant 79th.	
	New Song.	
	[illegible]h Mob and Charlies.	
	[illegible]ue my Love, etc.	
	[illegible]eroes of '38.	

Date.	Subject.	
1838.	Malacologia Monensis,	1 vol. 12mo, 70 pp.
	The University Snowdrop, (A pamphlet containing a selection of the songs written after the snow-ball riots, and including the six by Forbes given above.)	Pamphlet, 24 pages.
	On the Specific Claims of Primula acaulis, veris, and elatior,	Ann. Nat. Hist. II. 140.
	On the Distribution of Pulmoniferous Mollusca in Europe (read before Brit. Association,)	Brit. Ass. Rep. Sect. p. 112.
	On the Primula elatior of Jacquin,	Ann. Nat. Hist. III. 124.
	On the Land and Fresh-water Mollusca of Algiers and Bougia,	Ann. Nat. Hist. II. 250.
1839.	Review of Johnston's British Zoophytes,	Ann. Nat. Hist. III. 46.
	"Le pour et le Contre," a Song from Desangiers,	Edin. Univ. Mag.
	On Two British Species of Cydippe,	Ann. Nat. Hist. III. 145.
	"Time," a Song from Béranger,	Edin. Univ. Mag. No. III.
	Notice of a Botanical Excursion to the Mountains of Ternova,	Ann. Nat. Hist. III. 236.
	Notice of Researches in Shetland,	Brit. Ass. Rep. 1839.
	On the British Ciliograda (in conjunction with Mr. Goodsir),	do.
	Report on the Distribution of Pulmoniferous Mollusca in the British Islands,	do. p. 127.
	The Dudley Expedition, an Association Medley,	Lit. Gazette, Sept. 7.
	On the Asteriadæ of the Irish Sea,	Wernerian Mem. VIII.
	On the Association of Mollusca on the British Coasts, considered with reference to Pleistocene Geology.	Edin. Acad. Ann. 1840. *See* Mem. Geol. Survey Great Brit. I. 371.
	On a Shell-bank in the Irish Sea,	Ann. Nat. Hist. IV. 217.
	Squib, in verse, on Revivals,	Fife Herald, December.
	Parody on Old English Gentleman,	do.
	Observations on the Objects of Philosophical Associations,	do.
1840.	On the Botany of Trieste (read before Botanical Society, 14th November 1839,	Ann. Nat. Hist. IV. 307.
	"A Night Scene" (a little poem),	L'pool High School Mag.
	Abstracts of his Lectures at Liverpool,	Liverpool Albion.
	On some New and Rare British Mollusca,	Ann. Nat. Hist. V. 102.
	The Origin of the Garden Rose (a little poem),	Glasgow College Album.
	On certain Continental Plants, etc.,	Bot. Soc. Trans.
	On the British Actiniadæ,	Ann. Nat. Hist. V. 180.
	On Corymorpha Nutans (along with Mr. Goodsir),	do. V. 309.
	Note on Animalcules,	do. V. 363.
	"Dark Eyes," a Song,	Manx Sun.
	On the British Ciliograda, } in conjunction with On Pelonaia, } Mr. Goodsir,	[illegible]

Date.	Subject.	
1840.	Dredging Report,	Brit. Ass. Rep. Sect. p. 444.
	On a Pleistocene Tract in the Isle of Man,	do. p. 104.
	Dredging Song,	Literary Gazette, Nov. 7.
	John Chinaman : A Jolly New Ballad on the Chinese War,	do. Nov. 14.
	Zoo-Geological Considerations on the Fresh-water Mollusca,	Ann. Nat. Hist. VI. 241.
	On Lottia Pulchella,	do. VI. 316.
	On the Genus Euplocamus,	do. VI. 317.
	On the Blood of Nudibranchia,	do. do.
	Abstract of a Lecture on Zoo-Geology and Psychology.	Scottish Standard newspaper.
1841.	Note on the Cause of Ciliary Motion,	Edin. Monthly Medical Journal, I.
	Abstract of Classification of the Mollusca,	Jameson's Jour. 1841.
	Contributions to British Actinology,	Ann. and Mag. Nat. Hist. VII. 81.
	Note on the Appendages of the Anthers in the Genus Viola,	Do., p. 157.
	On a New Genus of Ascidian Molluscs,	Do., p. 345.
	On Two Remarkable Marine Invertebrata, inhabiting the Ægean Sea.	Rep. Brit. Ass. 1841, Sect. p. 72.
	On Thalassema and Echiurus, in conjunction with Mr. Goodsir.	Edin. New Phil. Jour. XXX. 369.
	On Pelonaia, in conjunction with Mr. Goodsir,	Do., XXXI. 29.
	A History of British Star-fishes. 1 vol. 8vo.	
1842.	Letter on the Rev. Mr. Daniell's Travels,	Athenæum.
	Letters on Travels in Lycia, etc.,	Ann. Nat. Hist. IX. 239; X. 59, 124, 205, 348.
1843.	On Maianthemum Bifolium,	Ann. Nat. Hist. XI. 159.
	On a New Star-fish,	do. XI. 280.
	On Pectinura, and the Species of Ophiura inhabiting the Eastern Mediterranean.	Do., XI. 463; Trans. Lin. Soc. XIX.
	Retrospective Comments (Natural History),	Ann. Nat. Hist. XII. 40.
	Note in Reply to Mr. Hassal,	do. XII. 188.
	Lecture on Botany,	Pamphlet, published by Van Voorst.
	On the Radiata of the Eastern Mediterranean,	Trans. Linn. Soc. XIX. 143.
	Abstract of Papers read at the British Association.	Athenæum and Literary Gazette.
	Report on the Mollusca and Radiata of the Ægean Sea,	Rep. Brit. Ass. 1843, 130.
	"Blarney Unvisited," a Song,	Literary Gazette.
	On the Species of Neæra inhabiting the Ægean Sea,	Ann. Nat. Hist. XIII. 306.
	Deliciæ Scientiarum,	Literary Gazette, Dec. 9.
	Epigram on Buckland being made M.D.,	do.
	[illegible]tions for Dredging,	Tulk & Henfrey's Manual.
	[illegible] Archipelagos of Hearts," a Song,	Lit. Gazette, Jan. 6, 1844.

Date.	Subject.	
1844.	Father Matthew's Journey to China, and How he nearly Broke the Pledge there, a Song,	Lit. Gazette, Jan. 27.
	Article on Brown's Chemical Notions, ...	do. do.
	Lecture on the Bearing of Marine Researches on Geology, ...	Jameson's Jour. xxxvi. 318.
	Reviews of—	
	Philip's Life of Smith, ...	Athenæum.
	American Geol. Transactions, ...	do.
	Richardson's Geology, ...	do.
	Garner's Staffordshire, ...	do.
	Ansted's Geology, ...	do.
	Paper on British Fossil Ophiuridæ, ...	Proc. Geol. Soc. iv.
	Abstract of Papers read before the British Association, York, ...	Athenæum.
	Review of "Vestiges of Creation,"	Lancet.
	Review of Mantell's "Medals of Creation," ...	do.
	Lines (Parody on Kubla Khan) on Hungerford Bridge, ...	Punch.
	On the Morphology of the Reproductive System of the Sertularian Zoophyte, ...	Ann. Nat. Hist. xiv. 385.
	On some Additions to the British Fauna, ...	do. do. 410.
	On the Medusa Proboscidalis, ...	Proc. Lin. Soc. Nov. 1844.
	Report on the Tertiary Fossils of Malta and Gozo, ...	Proc. Geol. Soc. iv.
1845.	On some Cretaceous Fossils from New Jersey,	Quart. Jour. Geol. Society, i. 61.
	Report on Fossils from Southern India (read January 31, 1844, ...	Do., i. 79.
	Report on the Lower Greensand Fossils in the possession of the Geological Society, ...	Do., i. 78.
	Account of Two Fossil Species of Creseis (read March 1844), ...	Do. i., 145.
	On the Fossils of the Fresh-water Tertiary Formation of the Gulf of Smyrna (read April 17, 1844), ...	Do., i. 162.
	Report on the Fossils from Santa Fe de Bogota (read May 1, 1844), ...	Do., i. 174.
	Valentine by a Palæontologist, ...	Literary Gazette, Feb. 18.
	On some remarkable Analogies between the Animal and Vegetable Kingdoms (Lecture at Royal Institution), ...	do. Feb. 14.
	Catalogue of the Lower Greensand Fossils in the possession of the Geological Society.	Quart. Jour. Geol. Society, i. 237, 345.
	On a New Species of Cardium from the Greensand of Devonshire, ...	Do., i. 408.
	On the Section between Black Gang Chine and Atherfield Point (in conjunction with Capt. Ibbetson), ...	Do., i. 190.
	On some Echinodermata from the Miocene Strata of North America, ...	Do., i. 45

Date.	Subject.	
1845.	On the Distribution of Endemic Plants, ...	Brit. Ass. Rep. 1845.
	Notice of Additions to the Marine Fauna of Britain, ...	do.
	On the Fresh-water Fossils of Cos, ...	do.
	On Preserving Medusæ, ...	do.
	Notice of Strzelecki's New South Wales, ...	Athenæum
	Reminiscences of Xanthus, ...	Literary Gazette, Nov. 8.
	Branchiostoma, ...	Penny Cyclopædia, Supp.
	Insects, Geographical Distribution of, ...	do. do.
	Ichthyology, recent Additions to (and other articles), ...	do. do.
1846.	Review of Murchison's Russia, ...	Athenæum.
	Report of Potato Commission (a squib in verse,	Bentley's Miscellany.
	On the Geology of Lycia (in conjunction with Lieutenant Spratt, R.N.)	Quart. Jour. Geol. Society, II. 8.
	List of Pleistocene Fossils from the Isle of Man, ...	Do., 346.
	Review of Murchison's Russia, ...	Literary Gazette, Feb. 7
	The Poet's Corner, ...	do. do.
	On the Connexion between the Existing Fauna and Flora of the British Isles, and the Geological Changes which have affected their Area, ...	Mem. Geol. Sur. I. 336.
	On the Pulmograde Medusæ of the British Seas.	Ann. Nat. Hist. XVIII. 284; Brit. Ass. Rep. 1846.
	Notices of Natural History Observations bearing upon Geology, ...	Brit. Ass. Rep. 1846.
	Note on Sections of Isle of Wight, ...	do. do.
	Travels in Lycia (in conjunction with Lieut. Spratt), two vols.	Van Voorst.
	Monograph on the Cretaceous Fossils of Southern India,	Trans. Geol. Soc. 2d Series, VII.
	On Palæozoic and Secondary Fossil Molluscs of South America.	App. to Darwin's Geology of South America.
	On some Fossils from Samos and Eubœa (read 18th November), ...	Jour. Geol. Soc. III. 73.
1847.	New and Rare British Animals, ...	Ann. Nat. Hist. XIX. 96, 390.
	Notice of Munby's Flora of Algiers, ...	Do., p. 398.
	On Orbitolites Mantelli (in Lyell's paper), ...	Quart. Jour. Geol. Society, IV. 11.
	Lecture on the Natural History Features of the North Atlantic (Royal Institution).	Athenæum and Literary Gazette, May 22.
	On the Families of British Lamellibranchiate Mollusca.	Brit. Ass. Rep. 1847, Sect. I. 75.
	Dredging Researches in progress, ...	Do., 77.
	Fate of the Dodo, ...	Literary Gazette, July 3.
	Seven political leading articles at election time, ...	In various papers.
	Letter on Irish Fisheries, ...	Morning Herald.

Date.	Subject.	
1847.	List of Shells in the Temple of Serapis (an Appendix to Mr. Babbage's paper).	Quart. Jour. Geol. Society, III. 216.
1848.	History of British Mollusca (with Mr. Hanley, begun in January),	Van Voorst.
	Palæontological Map of the British Isles, with a Summary of British Palæontology and Geology.	Keith Johnston's Physical Atlas.
	On some New Fossil Shells from Barbadoes,	Ann. and Mag. Nat. Hist. 2d Series, I. 347
	Lecture on the Question whether Generic Centres Exist (Royal Institution),	Literary Gazette, Mar. 4.
	Note on the Flora of the Isle of Man,	In Cumming's "Isle of Man."
	Notice of Discoveries among the British Cystideæ,	Brit. Ass. Rep. for 1848.
	On some Marine Animals from the British Channel,	do. do.
	Monograph of the Naked-Eyed Medusæ,	1 vol. 4to (Ray Society)
	Notice of some Peloria Varieties of Viola Canina (read before Linnæan Society, 6th June).	Ann. and Mag. Nat. Hist. 2d Series, II. 357.
	Monograph of the British Fossil Asteriadæ,	Mem. Geol. Sur. II. Part 2,
	Monograph of the Silurian Cystideæ of Britain,	do. do.
	Memorandum respecting some Fossiliferous Localities alluded to in Mr. Ramsay's and Mr. Aveline's Paper.	Quart. Jour. Geol. Society. IV. 297.
1849.	Lecture on the Question, Whether New Species have come into Existence since the Creation of Man (Royal Institution).	Athenæum & Lit. Gazette, March 2.
	Note on a Letter from Mr. Macandrew about the Mollusca of Vigo Bay.	Ann. Nat. Hist., 2d Series, III. 507.
	British Organic Remains, Decade 1; and paper on Ampyx, in Decade 2.	Memoirs of the Geological Survey.
	On the Varieties of the Wild Carrot,	Brit. Ass. Rep. for 1849.
	On a Monstrosity of a Vinca,	do. do.
	On the Reproduction of Berõe Cucumis,	do. do.
	On the British Patellaceæ,	do. do.
	Song of the Berõe,	Lit. Gazette, Oct. 6.
	British Mollusca, vol. ii. (with Mr. Hanley),	Van Voorst.
1850.	Note on Fossiliferous Deposits in the Middle Island of New Zealand.	Quart. Jour. Geol. Society, VI. 343.
	Lecture on the Distribution of Fresh-water Animals and Plants.	Abstracts in Athenæum and Lit. Gazette.
	On the Succession of Organic Remains in the Dorsetshire Purbecks,	Brit. Ass. Rep. for 1850.
	On the Distribution of European Echini,	do.
	Note of Discoveries in Hebrides,	Jameson's Jou[illegible]
	British Organic Remains, Decade 3, Echinoderms.	Memoirs of th[illegible] Survey.
	Lecture at the Opening of the Medical Lectures at King's College, London, Oct. 1.	Daily News Journal.

Date.	Subject.	
1850.	Description of Fossil Echinidæ from Portugal (a Note to Mr. Sharpe's Paper, read 21st November 1849).	Quart. Jour. Geol. Society, VI. 195.
	On Cardiaster, ...	Ann. Nat. Hist. 2d Series, VI. 442.
	On the Species of Mollusca collected during the Surveying Voyages of the "Herald" and "Pandora."	Proc. Zool. Soc. 1850, pp. 53, 270.
1851.	Article on Sedgwick's Discourse on the Studies of the University of Cambridge, ...	Lit. Gazette, January 4.
	Article on Bon Gaultier, ...	do. do.
	Do. Cheever's Whaling, ...	do. January 11.
	Do. Physical Geography, ...	do. January 18.
	Do. Hutton's Chronology of Creation, ...	do. February 15.
	Do. De la Beche's Geological Observer,	do. April 5.
	Do. Lyell (and on his Speech), ...	do. April 12.
	Do. Lady M. S. Wortley's Travels, ...	do. May 17.
	Do. California, by Kelly, ...	do. May 24.
	Do. A Trip to Mexico, ...	do. March 8.
	Do. Miss Martineau, ...	do. July 12.
	Do. Albert Smith's Constantinople, ...	do.
	Lecture on Recent Researches into the Natural History of the British Seas.	Proc. Royal. Inst.; Ann. and Mag. Nat. Hist. 2d Series, VII. 232.
	On the Discovery by Dr. Overweg of Devonian Rocks in North Africa, ...	Brit. Ass. Rep. for 1851.
	On the Echinodermata of the Crag, ...	do. do.
	On a New Species of Maclurea, ...	do. do.
	On some Indications of the Molluscous Fauna of the Azores and St. Helena, ...	do. do.
	On a New Testacean discovered during the Voyage of H.M.S. Rattlesnake, ...	do. do.
	On the Estuary Beds and the Oxford Clay at Loch Staffin.	Quart. Jour. Geol. Society, VII. 104.
	On the Vegetable Remains from Ardtun Head (Note to the Duke of Argyle's Paper), ...	Do. 103.
	Essay on the Vegetable Wor[illegible] contributed to the Great Exhibition, ...	Art Journal.
	Notes on various Vegetable and Animal Products in the Great Exhibition.	Hunt's Guide; Illustrated Catalogue of Great Exhibition.
	Song on Negative Facts, a New Ballad on the State of Geological Science, ...	Lit. Gazette, July 12.
	Reports of the Proceedings of the Natural History [illegible] of the British [illegible]	do. July 12, 19.
	[illegible] nley.)	Van Voorst.
	...	Voyage of the "Rattlesnake," vol. II.
	...	Lit. Gazette, June 7.

Date.	Subject.	
1851.	Article on Christmas's Mediterranean, ...	Lit. Gazette, August 2.
	Do. Neale's Travels in Syria, ...	do. Sept. 6.
	Do. Hitchcock's Religion of Geology, ...	do.
	Lecture on Natural History applied to Geology and the Arts.	Records of the School of Mines, vol. I. Part 1.
	On a Species of Æquorea inhabiting the British Seas.	Ann. and Mag. Nat. Hist. 2d Series, XIV. 294.
	Letter on our National Museums, ...	Lit. Gazette, Dec. 20.
1852.	On Hard Woods used for Ornament (four articles), ...	Art Journal.
	Article on Lyell's Elements, new edition, ...	Lit. Gazette, Jan. 24.
	Do. Squier's Nicaragua, ...	do. Feb. 7 & 14.
	Reply to Professor Sedgwick, ...	do. Mar. 20, Ap. 24.
	Article on Mundy's Australia, ...	do. May 22.
	Note on Eocene Echinodermata (Lyell's Paper on Belgian Tertiary Formations).	Quart. Jour. Geol. Society, VIII.
	Note on Marine Zones, ...	do. do.
	The Masque of Fraternity (a Poem), ...	Weekly News.
	Shell-fish, their Ways and Works, ...	Westminst. Review, Jan.
	On the Supposed Analogy between the Life of an Individual and the Duration of Species.	Lecture at Royal Institution; Ann. & Mag. Nat. Hist., 2d Series, x. 59.
	On the Extinct Land Shells of St. Helena, ...	Quart. Jour. Geol. Society, VIII. 197.
	On Arctic Echinoderms, ...	Append. to Dr. Sutherland's Arctic Voyage.
	Monograph of British Tertiary Echinoderms,	Palæontographical Society, vol. for 1852.
	Notices of English Scientific Works, ...	Westminster Review.
	Lecture on Australian Rocks, addressed to Emigrants.	Lectures on Gold, published by Bogue.
	The Future of Geology, ...	Westminster Review, July.
	Article on Thompson's Thibet, etc., ...	Lit. Gazette, August 21.
	On the Fossils of the Yellow Sandstone of the South of Ireland, ...	Brit. Ass. Rep. for 1852.
	On a Species of Sepiola new to Britain, ...	do. do.
	On a New Map of the Geological Distribution of Marine Life, and on the Homoiozoic Belts, ...	do. do.
	Plants and Botanists, ...	Westminster Review, Oct.
	British Mollusca, vol. iv., ...	Van Voorst.
1853.	Notice of Von Buch, ...	Lit. Gazette, March 12.
	Lecture on some New Points in British Geology.	Brit. Inst. Rep. for 1853, Part III. 246.
	On the Fluvio-Marine Tertiaries of the Isle of Wight.	
	Review of Gray's edition of Lo	
	Geology, Popular and Artisti	
	Lecture on the Educational	
	(October 1).	

Date.	Subject.	
1853.	*On the Geology of Lebanon,*	Appendix to Risk Allah Effendi's work on Syria.
	The Professorship of Chinese, ...	Literary Gazette, Dec. 31.
1854.	*Review of Hooker's Himalaya,*.....	Lit. Gaz. Feb. 25, Mar. 4.
	Do. Smyth's Mediterranean, ...	do. March 18.
	Do. Martin's Correggio,.....	do. June 3.
	Do. Murchison's Siluria, ...	do. June 24.
	Note on Spadix Purpurea, ...	Ann. and Mag. Nat. Hist. 2d Series, XIII. 31.
	On the Manifestation of Polarity in the Distribution of Organized Beings in Time (April 28).	Royal Inst. Rep. Part IV. 428.
	Note on an Indication of Depth of Primeval Seas afforded by the Remains of Colour in Fossil Testacea, ...	Proc. Royal Soc. Mar. 23.
	Map of Homoiozoic Belts, etc., ...	Johnston's Physical Atlas, April.
	Presidential Address at the Geological Society,	Quart. Jour. Geol. Soc. X.
	Part of the Natural History Guide-Book for the Crystal Palace at Sydenham.	
	Inaugural Address to the Natural History Class at Edinburgh.	Edinburgh Monthly Jour. of Science.
	Notice of Balfour's Botany, ...	do. do.
	Do. Professor Jameson, ...	Do., and Literary Gazette April 29, 1854.
	On Foliation of Metamorphic Rocks in Scotland, ...	Brit. Ass. Rep. for 1854.
	On some Points connected with the Natural History of the Azores, ...	do. do.
	Article on Murchison's Siluria, ...	Quarterly Review, Oct.
1855.	Introductory Lecture to Natural History Class at Edinburgh, Session 1854-55.	Edin. New Phil. Journal, January 1855.
1858.	On the Fluvio-Marine Tertiary Strata of the Isle of Wight (completed by Mr. Austen, Professor Ramsay, and Mr. Bristow).	Memoirs of the Geological Survey.
1859.	Natural History of the European Seas (continued and completed by Mr. Austen), ...	One vol. 12mo, Van Voorst.

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